Review of Evidence-Based Practices for Language Intervention of School-Age Children: Implications for Treatment, Research, and Personnel Preparation in Speech-Language Pathology

Prepared for the Center on Personnel Studies in Special Education

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October 2006
COPSSE Document No. OP-2

Center on Personnel Studies in Special Education

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In addition to our authors and reviewers, many individuals and organizations have contributed substantially to our efforts, including Drs. Erling Boe of the University of Pennsylvania and Elaine Carlson of WESTAT. We also have benefited greatly from collaboration with the National Clearinghouse for the Professions in Special Education, the Policymakers Partnership, and their parent organizations, the Council for Exceptional Children and the National Association of State Directors of Special Education.

The Center on Personnel Studies in Special Education, H325Q000002, is a cooperative agreement between the University of Florida and the Office of Special Education Programs of the U. S. Department of Education. The contents of this document do not necessarily reflect the views or policies of the Department of Education, nor does mention of other organizations imply endorsement by them.

Recommended citation:

Cirrin, F.M., & Gillam, R. (2006). Review of evidence-based practices for language intervention of school-age children: Implications for treatment, research, and personnel preparation in speech-language pathology. *(COPSSE Document Number OP-2).* Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.

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ABSTRACT

This systematic review focused on peer-reviewed articles published in the past 20 years that assessed the outcomes of language therapy for school-age students with language disorders. The purposes are: (a) to identify effective language intervention practices used by Speech-Language Pathologists [SLPs] that lead to positive outcomes for school-age children with language disorders; (b) to identify gaps in the evidence base and areas in need of further research; and (c) to discuss implications for personnel preparation based on what is known about effective practices for language intervention in schools.

A computer search of electronic databases and hand searches of other sources revealed 19 studies that used experimental designs of the type that are generally considered to be reliable and valid: randomized clinical trials, systematic reviews, non-randomized comparison studies, and single-subject design studies. The studies that meet our criteria for inclusion were grouped into the general areas of Syntax/Morphology, Semantics/Vocabulary/Concepts, Phonological Awareness/ Metalinguistics, Computer-based Language Intervention, and Pragmatics/Conversation/ Discourse/Narratives.

This review revealed relatively few studies of the effectiveness of language intervention practices with school-age children over the past 20 years. In addition, 11 of the 19 studies we found limited participants to children in kindergarten and first grade, and no studies were located that looked at students with language disorders in middle grades or in high school.

We conclude that the effectiveness of many language intervention practices that are currently being used with school-age children with language disorders has not been directly tested. We outline specific areas where there are significant gaps in the evidence and discuss the implications of evidence-based practices for personnel preparation in Speech-Language Pathology [SLP].

INTRODUCTION

As part of the current climate of accountability in our nation's schools, Speech-Language Pathologists [SLPs] face increasing mandates to use instructional methods that have demonstrated effectiveness and efficiency and to apply evidence-based practice [EBP] when making assessment and intervention decisions (Individuals with Disabilities Education Act [IDEA], 2004). New graduates from personnel preparation programs who serve school-age children must be well prepared to apply EBP to clinical decision making when they are employed in schools. This requires that they begin their careers with knowledge of evaluation and intervention techniques that are supported by scientific evidence. EBP has been defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients…[by] integrating individual expertise with the best available external clinical evidence from systematic research" (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996, p. 71). The American Speech-Language-Hearing Association [ASHA] has conceptualized the goal of EBP as the integration of (a) clinical expertise, (b) best current evidence, and (c) client values to provide high-quality services that reflect the values, needs, and choices of students and families served by SLPs (ASHA, 2004a). Readers are referred to ASHA's position paper and technical report on EBP (ASHA, 2005a, 2005b) for further information on EBP in the discipline of Speech-Language Pathology [SLP].

SLPs working in the schools provide services to students from every disability category in the Individuals with Disabilities Education Act (2004) presenting with a wide range of speech and language disorders (ASHA, 2004b). A review of the research examining intervention for all these disability groups and speech and language disorders would far exceed the scope of this project. Therefore, this review focuses on experimental research on the effectiveness of language therapy provided in school settings to students with language disorders. These students make up the largest subgroup of students with communication disorders who receive intervention services from SLPs in schools (ASHA, 2004b). Children with language disorders, often referred to as having a specific language impairment or a language-learning disability (Paul, 2001), are a heterogeneous group who have difficulty acquiring, comprehending, and/or expressing themselves with spoken and/or written language. These children may have difficulties in one or more aspects of language, including phonology, semantics, grammatical morphology, complex syntax, and/or pragmatics. Many of these children present problems in information processing skills related to attention, speech perception, working memory, and phonological awareness. Their difficulties with learning and using language place them at significant risk for social and academic problems throughout the school-age years and into young adulthood.

To provide effective services to school-age children with language disorders, practicing clinicians and students in university training programs need a strong background in language intervention strategies that have been demonstrated to be effective. The purposes of this paper are: (a) to identify effective language intervention practices used by SLPs that lead to positive outcomes for school-age children with language disorders, (b) to identify gaps in the evidence base and areas in need of further research, and (c) to discuss implications for personnel preparation based on what is known about effective practices for language intervention in schools.

METHODS

1. This systematic review focuses on peer-reviewed articles published in the past 20 years that assessed the outcomes of language therapy for school-age students with language disorders. A systematic review, which is a formal assessment of a body of scientific evidence related to a clinical question, describes the extent to which various diagnostic or treatment approaches are supported by the evidence but stops short of making specific recommendations for clinical practice (ASHA, 2004a). Computer searches of electronic databases were conducted to locate appropriate studies. These databases and search terms used are presented in Appendix A. In addition, the Bamford-Lahey Children's Foundation (2004) database on EBP in child language disorders and the following journals were searched to locate relevant literature: *Language, Speech, and Hearing Services in Schools*; *Journal of Speech, Language, and Hearing Research*; and *American Journal of Speech-Language Pathology*. We also examined the reference lists in the studies that were identified in our search for articles that we may have missed. Searches of other sources of the literature (e.g., Dissertation Abstracts International and textbooks) and searches for unpublished studies and presentations were not conducted; thus, the conclusions based on this review should be considered tentative. We reviewed all studies that met the following selection criteria:

2. Studies had to focus on experimental measures of the effectiveness of language intervention practices for students with language disorders. Descriptions of language intervention programs without objective measures of treatment effectiveness were not included.

3. Studies had to include school-age students with language disorders as a primary disability. To be considered school-age, students had to be in kindergarten through 12th grade and/or over the typical age for kindergarten entry (over 5 years). Studies on language intervention with preschool children (under the age of 5) with specific language impairments were not included in this review because of our focus on school-age students and constraints on time and resources. Further discussion of the implications of this decision appears below. Neither were studies of language intervention (e.g., vocabulary, linguistic concepts) with "at risk" students (without identified language disabilities) in general education settings included. Studies of students with language disorders related to autism spectrum disorders (ASD) and to cognitive disabilities or general developmental delays were not included in this review because comprehensive reviews of this literature have already been published. Readers are referred to Goldstein (2002) for a systematic review of language intervention studies for students with ASD and to Sigafoos and Drasgow (2003) for a review of studies of language intervention for students with cognitive disabilities.

4. Studies had to be one of the following design types: Level 1 (which includes randomized clinical trials [RCTs] and systematic reviews of RCTs); or Level 2 (which includes nonrandomized comparison studies and single-subject design studies). In a study that uses a Level 1 design, the investigator actively compares two different treatment conditions that he or she has created by randomly assigning participants to conditions.

Level 2 studies include comparisons of treatment groups when investigators did not use random assignment. Most researchers in SLP also include multiple-baseline, single-subject design studies in Level 2. We limited our review to Type 1 and Type 2 studies because these yield data generally considered to be reliable and valid. Further descriptions of research design characteristics and an overview of levels of an evidence system for evaluating individual studies of treatment efficacy are presented in Appendices B and C.

5. Studies had to be published between 1985 and 2005 in peer-reviewed journals.

6. Studies that had reading/writing skills as intervention targets as the main focus were not included. Studies on the production or comprehension of written/read vocabulary were not included.

Effect size is a method of quantifying the effectiveness of a particular intervention relative to some comparison intervention (i.e., quantifies the size of the difference between two groups)[see Schuele & Justice (2006) for a tutorial on the interpretation of effect size]. We calculated and reported effect sizes when sufficient data (i.e., pretest and posttest means and standard deviations) were provided for group and single-subject designs. Group effects were calculated using Cohen's *d*, in which effect size=M (posttest score of the experimental group) – M (posttest score of the control group)/pooled standard deviation. Effect sizes were computed using the following on-line effect size calculators: www.cemcentre.org/ebeuk/research/effectsize/Calculator.htm and web.uccs.edu/lbecker/Psy590/escalc3.htm. With this method, an effect size of 0.2 is considered small, 0.5 is medium, and 0.8 or greater is large (Cohen, 1988). Effect sizes for single-subject designs (in which a single child's performance is compared over one or more baseline periods with treatment periods) were calculated by computing the percentage of non-overlapping data (the percentage of data points during the treatment phase that are higher than the most positive data point for the baseline period). With this method, higher percentages of non-overlapping data indicate stronger effects: 90%=very high; 70%–90%=moderate; 50%–70%=mildly effective or questionable; <50% = ineffective.

RESULTS

A total of 19 studies that met the five criteria were located and reviewed.

Tables 1-5 provide a summary of the language intervention studies reviewed in this paper according to the specific aspects of language that were the target of the intervention or, in the case of computer-based intervention, the general intervention approach used:

Table 1 – Syntax/Morphology (2 studies)
Table 2 – Semantics/Vocabulary/Concepts/Word Finding (6 studies)
Table 3 – Phonological Awareness/Metalinguistics (4 studies)
Table 4 – Computer-Based Language Intervention (5 studies)
Table 5 –Pragmatics/Conversation/Discourse/Narratives (2 studies).

These five language categories are somewhat broad, so we grouped studies (i.e., treatment targets) into these general domains to aid interpretation of our results. We have attempted to offset the heterogeneity of the treatment targets in each category by describing the actual language targets taught in these intervention programs in the tables and in the text.

Each table includes authors, publication title, and date of the study [col. 1]; study participants, sample sizes, ages, primary disability, location or class placement of the study, and service provider [col. 2]; research design, treatment targets, therapy methods [col. 3]; major findings, including any effect sizes [col. 4].

Syntax and Morphology

Our search yielded two studies of interventions designed to treat aspects of syntax and morphology in school-age children. See **Table 1**. One study was a nonrandomized comparison of experimental and control groups (Connell & Stone, 1992); and one study was a multiple-baseline, single-subject design (Weismer & Murray-Branch, 1989). A total of 36 students with specific language impairments participated; all participants were under age 6 yrs 11 mo and presumed to be enrolled in kindergarten or first grade. Three of four participants in the single-subject study had expressive disorders, and the fourth had both receptive and expressive language disorders. The type of language disorder was not described for the 32 participants in the group comparison study.

Treatment targets in the Weismer and Murray-Branch study varied as each participant had different grammatical targets as per a language evaluation. Thus, participant A's targets were present progressive –ing, 3rd person singular –s, auxiliary "be" forms, and copula "be" forms; participant B's were regular & irregular past tense, nominative case pronouns, and auxiliary inversion for questions; participant C's were articles, present progressive –ing, 3rd person singular –s, auxiliary "be" forms, and copula "be" forms; participant D's targets were articles, present progressive –ing, auxiliary "be" forms, copula "be" forms, and prepositions (in, to, at). Treatment targets in the Connell and Stone study were investigator-designed invented morphemes: one of four suffixes attached to concrete nouns capable of being represented by

pictures, to indicate one of the following meanings (large/small, whole/part, whole/broken) (e.g., "TVum" to indicate a broken TV).

The single-subject study (Weismer & Murray-Branch, 1989) assessed participants' production of individualized grammatical targets after intervention consisting of adult models of targets and intervention that included models plus training stimuli structured to evoke child productions of target forms. The group comparison study (Connell & Stone, 1992) assessed students' production and comprehension of novel morphemes after treatment that presented adult models and treatment that included models plus a direction for the participant to imitate the target morpheme. The results of both studies indicated improved performance on language measures following all therapy methods (modeling, modeling plus evoked production, imitation); and all therapy methods appeared to be equally effective for the majority of participants.

The effect sizes of the comparisons between baseline and treatment phases in the Weismer and Murray-Branch study varied between "ineffective" (for the participant with mixed expressive and receptive disorder) and "large" (for participants with expressive disorder only). Effect sizes were not reported for the nonrandomized treatment comparison study (Connell & Stone, 1992) and could not be calculated because pretest and posttest scores were not reported.

The main limitations of research on intervention for syntax or morphological problems are the lack of a sufficient number of studies with school-age children and a lack of any Level 1 evidence to guide SLPs' clinical decisions about treating this common language problem. We found no studies on intervention for grammar in participants over 7 years of age and no studies that taught what clinicians regard as "complex syntax" (e.g., complex sentences, elaborated noun phrases, etc.) necessary to function in school settings. The intervention procedures that have been reported in the literature are limited to modeling, evoked production, and imitation. We were not able to find any studies on the effect of different service delivery models on the grammatical skills of students with language disorders or studies that examined generalization of skills learned in therapy to classroom curriculum performance.

Semantics, Vocabulary, Concepts, and Word Finding

Our search yielded six studies of interventions designed to treat aspects of semantics, vocabulary, concepts, and word finding in school-age children. See **Table 2**. All six studies were nonrandomized comparison studies. One study directly assessed the effects of different service delivery models on classroom vocabulary acquisition (Throneburg, Calvert, Sturm, Paramboukas, & Paul, 2000); one study examined the effects of stimulus presentation rate and other cues on the acquisition of novel vocabulary words (Weismer & Hesketh, 1993); one study assessed expressive and receptive standardized vocabulary test outcomes as a result of two reading feedback strategies (Crowe, 2003); one study examined the effects of direct instruction on a verbal analogies test (Masterson & Perrey, 1999); and two studies assessed the effects of treatment on students' word-finding skills (naming and recall) (McGregor & Leonard, 1989; Wing, 1990). A total of 65 students classified as having specific language impairment participated; 28 of these students were between ages 8 and 14 and the rest were under 7 years old. Grade levels of the participants were not specified in most studies.

Treatment targets in McGregor and Leonard's study were investigator-designed elaboration strategies (to provide the child with a richer knowledge of target words) and retrieval strategies (to teach the child to use information already known about target words) thought to aid word retrieval. These were taught via a set of 120 concrete nouns capable of being represented by pictures.. Treatment targets in Wing's study were investigator-designed semantic or phonological strategies thought to aid word retrieval and taught via a set of vocabulary items similar to but not duplicating items on the Test of Word Finding. Treatment targets in Masterson and Perrey's study, which were investigator-designed mediated learning and bridging strategies thought to aid in analogical reasoning (verbal analogy performance), were taught via a set of verbal analogies from five categories (synonyms, antonyms, function, linear order, and category membership). Treatment targets in Crowe's study were investigator-designed traditional reading decoding strategies or meaning-based Communicative Reading Strategies thought to aid oral language performance (e.g., receptive and expressive vocabulary performance). Throneburg et al.'s treatment targets were the meanings of a set of 60 vocabulary words from each classroom's general education curriculum. Finally, the treatment targets used by Weismer and Hesketh were the meanings of a set of nine investigator-designed novel words (one-syllable, consonant/vowel/consonant forms with early developing sounds) representing either object labels or locatives.

Language outcomes were measured by normed tests such as the Test of Word Finding (TWF) and the Comprehensive Receptive and Expressive Vocabulary Test (CREVT), or unpublished vocabulary, verbal analogy, naming, or recall tasks. The results of all six studies indicated improved performance on language measures following treatment, even though the results of several studies were somewhat equivocal. The Throneburg et al. (2000) study yielded similar improvements on the language measures for children who received vocabulary intervention through collaborative, classroom-based, and traditional pullout service delivery models, even though treatment effects were largest for collaborative and classroom-based models. Crowe's (2000) study indicated that participants' expressive CREVT scores improved more than those in the control and traditional decoding feedback groups, but the posttest performance of all groups on receptive and general vocabulary measures was worse than pretest performance. Direct instruction had positive effects on students' performance on a verbal analogies test over a control group (Masterson & Perrey, 1999). Intervention for word-finding problems improved the naming and recall performance of participants over controls, but data did not indicate which of two treatment strategies was more effective (McGregor & Leonard, 1989); scores of participants on the TWF increased significantly after a phonologically based treatment strategy but not after a semantic-based treatment (Wing, 1990).

The effect sizes of the comparisons between pretests and posttests for four studies ranged between moderate (Crowe, 2003; Wing, 1990) and large (Masterson & Perrey, 1999; Throneburg et al., 2000). Effect sizes were not reported for one study on word finding (McGregor & Leonard, 1989) could not be calculated for a study on the effects of prosodic and gestural cues on novel word acquisition (Weismer & Hesketh, 1993) because means and standard deviations were not provided.

There are relatively few studies on semantic, vocabulary, concept, and word-finding interventions and no Level 1 evidence. The studies report good outcomes and relatively large

treatment effects for children with language impairments who receive intervention that targets vocabulary and analogical reasoning. Only one study examined the effects of different service delivery models on students' ability to learn vocabulary from the curriculum. Until the research base expands and confirms the effectiveness of intervention programs for older students with semantic and vocabulary problems, clinicians working in school settings will need to select intervention procedures carefully and monitor students' progress on a regular and frequent basis.

Phonological Awareness and Metalinguistics

Our search yielded four studies of the effects of phonological awareness instruction with school-age children with language impairments. See **Table 3**. All four studies were Level 2 nonrandomized comparisons of experimental and control groups or cohort studies. The experimental groups received training in various combinations of rhyming, phoneme identification, phonological segmentation, phoneme blending, and sound-symbol correspondence. The treatment was provided within classrooms in one study (van Kleeck, Gillam, & McFadden, 1998). The other three studies provided treatment in pullout sessions. Phonological gains were measured by researcher-created tests. In the two articles by Gillon (2000, 2002), reading gains were measured by performance on standardized tests. The number of participants in the studies varied between 3 (Blischak, Shah, Lombardino, & Chiarella, 2004) and 91 (Gillon, 2000). All participants had speech and language disorders and ranged in age between 5 and 10 years. We excluded a number of other studies of phonological awareness intervention that were conducted on children with reading disorders or dyslexia rather than children with language impairments or did not employ Level 1 or Level 2 research designs.

Treatment targets in the van Kleeck et al. (1998) study focused on rhyming and phoneme awareness. The rhyming targets included rhyme recognition, rhyme identification, rhyme judgment, and rhyme generation. The phoneme awareness targets included matching initial sounds, identifying initial sounds, generating words that begin with target sounds, sound blending, and sound analysis. Gillon (2000, 2002) studied phonological awareness outcomes in three intervention conditions. The phonological awareness intervention targeted phonological identification, phoneme manipulation, phoneme segmentation, grapheme-phoneme correspondence, and phoneme production. The traditional intervention targeted phoneme production in isolation, syllables, words, and phrases. The minimal intervention focused on phoneme production through monthly consultation between SLPs, teachers, and parents. Finally, the intervention in the Blischak et al. (2004) study focused on phoneme-grapheme correspondence, phoneme segmentation, phoneme manipulation, and pseudo word spelling.

The four studies demonstrated improved performance on phonological awareness measures following treatment. For example, Gillon compared the outcomes of impaired and nonimpaired children immediately after treatment (2000) and one year after treatment (2002). Her results suggest that children with speech and language impairments normalized on the phonological awareness and word recognition measures.

Three studies yielded large effect sizes. Van Kleeck et al. (1998) compared children in preschool and prekindergarten classes with a cohort of children who had attended those classes the previous year. The children who received treatment performed more than 1.5 standard deviations

better on their phoneme awareness measures than older children who had attended the same classes a year earlier. Effect sizes could not be computed for the phonological awareness measures for the Gillon (2000, 2002) studies but were computed for word recognition measures. In those investigations, children with language impairments performed 0.64 standard deviations better than normally achieving, age-matched controls one year after intervention. Finally, Blischak et al. (2004) found that 3 children in a multiple-baseline design study improved on phoneme manipulation and encoding probes. Across the 3 children who participated in their study, 85% of the phoneme manipulation probes in the instruction phase were above baseline levels, and 98% of the encoding probes were above baseline levels. Similar effects were found across individual, small group, and classroom collaboration treatments.

The main limitations of the research on phonological awareness instruction are that there are too few studies on phonological awareness intervention and no Level 1 evidence to support clinical decisions in which SLPs could have a high degree of confidence. The studies reported good outcomes for children with speech and language impairments who received intervention that targeted phonological awareness. There is consistent evidence supporting the use of phonological awareness intervention in school settings. However, until the research base in phonological awareness intervention programs expands, clinicians working in school settings will need to select intervention targets and procedures with caution and should monitor children's gains carefully.

Computer-Based Language Intervention

Our search yielded five studies of the effects of computer-based language intervention on children with language impairments. See **Table 4**. One study was an RCT (W. Cohen et al., 2005); three studies were Level 2 nonrandomized comparisons of experimental and control groups (Merzenich et al., 1996; Seger & Voerhoeven, 2005; Tallal et al., 1996); and one study was a Level 2 multiple-baseline, single-subject design (Gillam, Crofford, Gale, & Hoffman, 2001). Four studies assessed language or auditory processing outcomes after children played computer games associated with Fast ForWord-Language (FFW-L) or other computer games. Language gains were measured by global tests such as the Clinical Evaluation of Language Fundamentals, Third Edition; language sample analyses; or unpublished memory or auditory processing tasks. One study (Seger & Voerhoeven, 2005) assessed phonological awareness outcomes after children received treatment with phonological awareness games that either did or did not have a modified speech component. The number of participants in the studies varied between 4 (Gillam et al., 2001) and 60 (W. Cohen et al., 2005). All participants presented language disorders and ranged in age between 5 and 10 years. Three of the four studies included only children with mixed (receptive and expressive) language disorders. We excluded a number of other studies of Fast ForWord because these were conducted on children with reading disorders or dyslexia rather than children with language impairments, focused on reading instead of expressive or receptive language outcomes, and/or did not employ research designs that met the Level 1 or Level 2 criteria.

The treatment targets in the Merzenich et al. (1996) study included perceptual identification of tone sequences and phoneme recognition. The treatment targets in the Tallal et al. (1996) study included speech discrimination and on-line language comprehension. Both studies compared the

speech perception and language outcomes of children who received stimuli with or without acoustic modifications.

Cohen et al. (2005) compared language and literacy gains in children who received regular school services only, children who received regular school services plus Fast ForWord-Language (FFW-L), and children who received regular school services plus computer software without a modified speech component. The treatment targets for the individual speech and language services were not reported. The treatment targets for Fast ForWord-Language included discrimination of tones and minimal pair words, detection of phoneme changes, phoneme and syllable matching, recalling commands, and comprehending grammatical morphemes and complex sentence structures. The computer software arm targeted listening, spelling, phonological awareness, reading, writing, vocabulary, problem solving, narration, syntax, and morphology. Gillam et al. (2001) compared the language outcomes of children who received Fast ForWord-Language software and children who received Laureate Learning software. The language targets for the Fast Forword-Language condition were the same as those in the Cohen et al. (2005) study. The Laureate Learning software targeted comprehension and memory of words, grammatical morphemes, sentences, and stories. Finally, the treatment targets in the Seger and Voerhoven (2005) study were rhyming and phoneme synthesis in modified speech or unmodified speech conditions.

The results of all five studies indicated improved performance on language or phonological awareness measures following treatment with computer software. Comparisons of treatment (FFW-L) and control groups were somewhat equivocal. The Cohen et al. (2005) RCT and the Gillam et al. (2001) multiple-baseline design study yielded similar improvements on the language measures for children who received FFW-L and children who received another type of computer intervention for the same amount of time. Cohen and colleagues also included a control group who did not receive computer treatment. The outcomes for the FFW-L group and the control group did not differ. One of the three nonrandomized comparisons of experimental and control groups did not yield group differences between participants who received computer-based interventions with or without modified speech input. However, two other studies conducted by the team of researchers who developed the FFW-L program (Merzenich et al., 1996; Tallal et al., 1996) yielded outcomes that favored the children who received early (prepublication) versions of the FFW-L games with modified speech stimuli over children who received similar games without modified speech.

The effect sizes of the comparisons between the three FFW-L groups in the W. Cohen et al. (2005) study varied between small and trivial. Effect sizes could only be computed for the language sample measures in the Gillam et al. (2001) multiple-baseline study. Three of the 4 students in that study (1 who received FFW-L and 2 who received Laureate Learning games) presented improvements on mean length of utterance that were associated with relatively large effects (*d* values greater than .8). Effect sizes, which were not reported for the two nonrandomized treatment comparison studies (Merzenich et al., 1996; Tallal et al., 1996), could not be calculated because the authors did not provide means and standard deviations.

There are a number of limitations with the current research in computer-based language instruction. The main limitation with the research on computer-based language instruction is that

there are too few studies to support decisions in which clinicians could have a high degree of confidence. Only one RCT focused on children with language impairments. The Cohen et al. (2005) clinical trial needs to be replicated. One program, FFW-L, has been studied extensively. Needed are studies that examine the efficacy and effectiveness of the many other computer-based language intervention programs being used in schools. There is consistent evidence supporting the use of computer-based language intervention in school settings. However, until the research base in computer-based language intervention programs expands, clinicians working in school settings will need to select the programs they use with caution and will need to monitor children's gains carefully.

Pragmatics, Conversation, Discourse, and Narratives

Our search yielded two studies of interventions designed to treat aspects of pragmatics, conversation, discourse, and narratives in school-age children. See **Table 5**. Both studies employed multiple-baseline, single-subject designs (Bedrosian & Willis, 1987; Beilinson & Olswang, 2003). Four students with specific language impairments participated as subjects, ranging in age from 5 to 6 years. The participants were all kindergartners. One participant was classified as specific language impaired, and 3 were identified as having social communication deficits.

One single-subject study (Beilinson & Olswang, 2003) assessed participants' use of high-risk peer group entry behaviors after children received direct instruction in the steps in a group entry sequence. Treatment targets in Beilinson and Olswang's study were investigator-designed, peer-group entry behaviors (general and specific statements to peers and use of desirable toys as entry props), and investigator-designed steps in a peer-group entry sequence taught via a set of Meyer-Johnson picture symbols. The other single-subject study (Bedrosian & Willis, 1987) assessed the frequency of a student's topic initiations after direct instruction, modeling, and feedback within a communicative intervention context. Treatment targets in Bedrosian and Willis's study were an increase in the frequency of topic initiations in child/clinician conversation related to memory (past events) and topic initiations related to future events.

The results of both single-subject studies indicated improved performance on peer group entry and language measures. The effect sizes of the comparisons between baseline and treatment phases in the Beilinson and Olswang (2003) and the Bedrosian and Willis (1987) studies varied between moderate and quite large.

The main limitations with the research on pragmatics, conversational discourse, and narratives are that there are so few studies with school-age children with language disorders, no studies with children over 6 years old, and no studies with Level 1 evidence to support SLPs' clinical decisions. Given the theoretical and practical importance of students' narrative skills to literacy (ASHA, 2001), it is surprising that we found no Level 1 or Level 2 studies that investigated the effects of narrative-based intervention with school-age students. We excluded one pretest and posttest comparison study (Swanson, Fey, Mills, & Hood, 2005) that assessed the feasibility of an intervention designed to increase the quality and quantity of students' narratives because it did not employ a research design that met the Level 1 or 2 criteria (Note: It was not these authors' intent to evaluate the efficacy of the intervention approach). Until additional experimental

treatment research is available, SLPs must choose intervention procedures for the critical academic language skills of conversation and narrative and expository text production and comprehension with caution and monitor their students' progress carefully.

DISCUSSION

Caveats

There are a number of caveats concerning the present review of language intervention procedures in schools. First, this systematic review should not be viewed as practice guidelines or recommendations for clinical practice. As outlined in the ASHA technical report on EBP (ASHA, 2005b), it is recognized that evidence-based practice guidelines require a great deal of time, resources, and training. According to the Scottish Intercollegiate Guideline Network (SIGN, 2002; www.sign.ac.uk), 24 months is an estimate of the minimum time required to go from identifying a clinical question to review, to forming an expert review panel (including consumers), to reviewing and grading the available evidence, and finally to writing and disseminating practice guidelines. SIGN also describes the costs of such efforts. Given the timelines, resources, and scope of the present review, it was not possible to grade the evidence in studies as per SIGN guidelines or to adhere to all the procedures recommended by SIGN to construct impartial practice guidelines.

In addition, Johnston (2005) recently raised a number of issues about the value of existing systematic literature reviews in the area of SLP that also may pertain to the present review. For example, limiting reviews to studies utilizing RCTs or other experimental designs may exclude large sectors of the practice of speech-language intervention. Further, it has not been demonstrated that the evidence standards developed for healthcare clinical questions (e.g., regarding the safety of new drugs or medical procedures) may be the most appropriate to use for nonmedical or behavioral therapy methods. For example, there is a possibility that RCT studies may not prove to be the design of choice for studies on effective speech-language intervention methods. The design requirements of these studies (group comparisons, random assignment, blind assessment) make it nearly impossible for researchers to individualize instruction. In clinical practice, an individual's strengths and weaknesses are evaluated; and then treatment plans are tailored to the student's specific needs. That is not at all how clinical trials work. In these studies, a large cohort of children is assessed by a group of individuals who never speak to the clinicians providing the intervention services. Each child who is randomly assigned to a treatment arm receives the same intervention that focuses on the same treatment targets, whether those targets are related to the child's specific needs or not. For this reason, systematic reviews that are limited to clinical trials studies (Level 1 evidence) may not provide clinicians with the best evidence on which to base treatment decisions.

Another concern is that most systematic reviews to date have excluded children with language disorders as a secondary disability, including children with autism or developmental delay. Students with these disabilities make up a substantial proportion of children seen by SLPs in schools (ASHA, 2004b). Also, concerns can be raised when systematic reviews limit studies to children within a specific age range; for example, the present review excludes a large number of treatment outcome studies with preschool children. Finally, there are concerns that recent systematic reviews on the efficacy of speech-language intervention have not distinguished among different types or the subcomponents of complex treatment packages. In addition, the relationship between progress in therapy and number of treatment sessions has not been explored. On this last point, Law, Garrett, and Nye (2005) have argued that the current research

on effective treatments for speech and language disorders is best examined in terms of language goals and outcomes rather than type of intervention. This is because intervention descriptions are usually incomplete and underspecified and too heterogeneous to group in a meta-analysis.

Gaps in the Literature

This systematic review revealed relatively few studies of the effectiveness of language intervention practices with school-age children over the past 20 years. However, a wide variety of language intervention practices are being used in public school settings with a large number of students with language-learning disorders. As a result, clinicians have relatively little research evidence on which to base their practices.

In conducting the literature search for this paper, it was apparent that the majority of studies on effectiveness of language intervention for children with language disorders have been carried out with preschool children under the age of 5 years. This includes studies on intervention for targets in the general areas of syntax/morphology (e.g., Cole & Dale, 1986; Fey, Cleave, & Long, 1997; Fey, Cleave, Long, & Hughes, 1993; Fey & Loeb, 2002; Kaiser & Hester, 1994; Schwartz, Chapman, Terrell, Prelock, & Rowen, 1985; Tyler, Lewis, Haskill, & Tolbert, 2002, 2003); semantics/vocabulary/concepts (e.g., Girolametto, Pearce, & Weitzman, 1996; Robertson & Weismer, 1997; Wilcox, Kouri, & Caswell, 1991); phonological awareness/metalinguistics (e.g., Justice, Chow, Capellini, Flanigan, & Colton, 2003; Justice & Ezell, 2000); and pragmatics/discourse/conversation/narratives (e.g., Bradshaw, Hoffman, & Norris, 1998; Hayward & Schneider, 2000). In addition, the major meta-analyses of the effectiveness of speech and language intervention for children have been carried out exclusively on studies with preschool children (Law, Garrett, & Nye, 2003, 2004). It is reasonable to expect that older children might respond differently to various language intervention methods than young children would. The effectiveness of many language intervention practices that are currently used with school-age children (and apparently adapted from preschool language intervention studies) has not been directly tested. This research now needs to be carried out directly with school-age children with language disorders.

There is a strong need for studies that address basic questions about intervention effectiveness in school settings. The following are specific areas where there are significant gaps in the evidence on the effectiveness of language intervention with school-age children:

- The studies we reviewed had very few children beyond 5th grade as participants. Eleven of the 19 studies we found limited participants to children in kindergarten and first grade. No studies were located that looked at students with language disorders in middle grades or in high school. This is a major gap in the language intervention evidence base and is especially problematic for SLPs in school settings.

- SLPs who work in schools would benefit from efficacy studies that examine the language outcomes of specific intervention procedures. For example, a great deal of evidence exists supporting the use of contingent language facilitation procedures (e.g., modeling, imitation, recasts, focused stimulation) on the grammatical development of preschoolers (Fey, 1986;

Leonard, 1998; McCauley & Fey, 2006). However, there is no Level 1 or Level 2 research that examines the use of these facilitative strategies with school-age children.

- The few studies we found on syntax were limited to intervention programs designed to increase children's use of grammatical morphemes. A major gap in the research is the lack of research on interventions for "complex syntax" (e.g., complex sentences, elaborated noun phrases, elaborated verb phrases, interrogatives) necessary to function in school settings.

- We found no research examining the effectiveness of various language goal attack strategies (i.e., Fey, 1986; Tyler et al., 2003). A goal attack strategy, which refers to the way in which multiple goals are approached or scheduled, may include (a) a vertical strategy in which one goal at a time is focused on until some predetermined level of accuracy is achieved, (b) a horizontal strategy in which several goals are repeatedly targeted within every session, and (c) a cycle strategy in which several goals are targeted, each for a specified time period independent of accuracy, and the sequence is repeated.

- Only one of the 19 studies we reviewed (Cohen et al., 2005) examined treatment effect *maintenance*. That study found little or no effect of a computer-based language intervention program on student performance after six months. The lack of research on whether various language interventions produce lasting positive effects in school-age children is a major gap in the evidence.

- The effectiveness of specific intervention procedures on students' language outcomes needs to be systematically examined in the area of semantics and vocabulary/concepts. Specifically, research on treatment strategies is needed for curriculum vocabulary use and understanding (in conjunction with reading), the use of storybooks as a tool for fostering vocabulary development (i.e., Justice, Meier, & Walpole, 2005), and facilitating higher level language in school-age students with language disabilities (e.g., figurative language, multiple meaning words, idioms, metaphor).

- We found only three studies, all in the domain of Semantics/Vocabulary/Concepts/Word Finding (Crowe, 2003; Throneburg et al., 2000; Weismer & Hesketh, 1993), that included receptive language outcome measures, and one of those found a negative effect of intervention on receptive vocabulary (Crowe, 2003). Law et al.'s meta-analyses (2003, 2004) showed inconclusive effects for intervention on improving preschool students' receptive language skills. Research that examines the effectiveness of language intervention on the receptive language abilities of school-age students with language disorders is needed, especially given the large numbers of SLPs in schools who report serving students in this area (ASHA, 2004b).

- One major gap in language intervention outcome research for school-age children is in the area of narrative treatment strategies. There are many more articles and reports available regarding how it is done or should be done (e.g., Hoggan & Strong, 1994). SLPs who work in schools would benefit from efficacy studies on narrative outcomes for (a) prestory intervention methods (e.g., preparatory sets, summarizing, semantic word mapping, think-aloud, directed reading/thinking activities); (b) during-story intervention methods (e.g.,

extensions, questioning, episode/story mapping); (c) post-story intervention methods (e.g., question-answer relationships, internal states, word substitutions, discussion web, flow charting, story retelling, story grammar cueing, journal, dramatic play, story generation); and (d) interventions for narrative and expository text comprehension questions. For example, studies like Swanson et al. (2005) need to be carried out using Level 1 or 2 research designs. Swanson et al. assessed the quality and quantity of students' narratives after treatment that included story imitations and retells, story generation tasks, and repeated retellings of stories at home. Results indicated an increase in the narrative quality index for most participants (a rating of the characters, physical setting, plot, ending, and language sophistication of a child's narrative production), but not for the narrative quantity index (number of different words used).

- Research is needed on the effects of various service delivery models on language treatment outcomes for school-age children, including the effectiveness of different service delivery models on outcomes for different language targets (e.g., grammar, vocabulary, conversational discourse, narrative). A service delivery model, which is an organized configuration of resources aimed at achieving a particular educational goal, includes personnel, materials, specific instructional or intervention procedures, the schedule for provision of services, settings in which intervention services will be delivered, and the direct and indirect roles that service providers assume as they deliver language intervention to students with language impairments (Cirrin & Penner, 1995). Gaps in the evidence for service delivery models include research on the effectiveness of classroom-based and collaborative language interventions (e.g., Farber & Klein, 1999), collaborative consultation (e.g., Ellis, Schlaudecker, & Regimbal, 1995), classroom versus individual treatment for language disorders (e.g., Wilcox et al., 1991), group therapy versus individual therapy, and integrated indirect services for increasing the language abilities of students with severe disabilities (e.g., Giangreco, 2000).

- The lack of evidence on the use of curriculum-relevant materials and standards in language intervention (i.e., ecologically relevant therapy) and on the effects that language therapy has on students' progress in the general education curriculum (reading, writing, math) is especially problematic for SLPs who work in schools and must relate intervention to student progress in the general education curriculum as per IDEA requirements.

- Another major gap in the evidence is that no studies were found that examined the amount and frequency of intervention required to make significant progress on language targets for children in schools. A study by Jacoby, Lee, Kummer, Levin, and Creaghead (2002) determined the average number of treatment units needed to achieve improvements in functional communication for preschool children receiving services in a hospital setting. This study also provided some preliminary data on which children showed differential gains and needed more treatment units. For example, Jacoby et al. found that younger children received the greatest benefit per units of therapy provided and that children with lower initial functional communication abilities required more units of therapy to demonstrate improvement than children with higher initial ability levels. This type of research needs to be replicated in school settings with older children in grades K-12.

Implications for Personnel Preparation: Evidence-Based Practices Skill Set

SLPs and graduate students in training who intend to work with school-age children need a solid foundation in EBP process and content in order to provide effective services to students in schools with communication disabilities. A priority for ASHA is to help establish the skill set for EBP throughout the SLP workforce as well as to provide resources to make EBP as practical as possible in the workplace (i.e., schools; ASHA, 2004a). Specifically, SLPs working with school-age children with language disorders must be able to independently implement the principles of EBP and to identify, evaluate, and apply high-quality evidence in their clinical practice. Furthermore, in order to ensure that EBP becomes a part of the culture of the clinical professions, it is necessary to incorporate EBP into the pre-service education of SLPs (ASHA, 2004a). Clinical education programs in universities must begin to routinely instruct beginning clinicians in the principles and procedures of EBP.

Implications for Personnel Preparation: Knowledge of Evaluation and Intervention Techniques That Are Supported by Scientific Evidence

SLPs entering the workforce need to come to the job with a firm knowledge about the specific language treatment methods that are proven to be effective and that are supported by evidence. Universities need to stress this content-specific information as they prepare entry-level SLPs who choose to work with school-age children. As we have previously noted, a specific area of need is knowledge of effective service delivery options for language intervention, because there are significant discrepancies among recommended practice, reported practice, and graduate training (Whitmire & Eger, 2003). For SLPs already working in schools, continuing education providers must be encouraged to develop continuing education activities that address current best evidence for language intervention and critically assess the quality of that evidence in the course of educational offerings.

Implications for Personnel Preparation: Development of Action Research Protocols with School-Age Children and Collaborative Arrangements with Universities and Schools

The school setting as a laboratory for conducting research presents many challenges to research design and methodology. As previously mentioned, RCTs may not prove to be the design of choice for studies carried out in the schools. Random assignment to treatment groups and blind assignment of treatment providers is fraught with practical and legal issues. Applied research conducted in actual school environments may be more relevant to the provision of language intervention than research carried out in university labs or other controlled settings. Universities need to foster and train clinician-researchers who have the set of tools and techniques that allow them to conduct action research in real-life school settings. ASHA and other research-funding agencies should develop funding criteria with preference given to research proposals that identify research questions relevant to assessment, intervention, and service delivery for school-age children and that specifically demonstrate that these questions were developed through collaborative efforts with SLPs working in schools.

CONCLUSIONS

In conclusion, this systematic review of EBP of language intervention for school-age students with language disorders is a narrow sample of what needs to be done given the extensive scope of practice of communication disorders in schools. This review has identified a number of critical gaps in the evidence base for language intervention practices. In general, the quantity and quality of research for informing EBP optimally in schools must be enhanced. Specifically, resources are needed for studies on effective language intervention practices for school-age children (i.e., in grades K–12). To support the full scope of school-based speech-language services, funding is needed for research on effective intervention strategies for students with speech-language disorders in areas such as articulation, phonology, voice, fluency, reading, and written language. Finally, priority must be given to optimizing the research base supporting EBP for SLP conducted in schools and the eventual development of well-supported clinical practice guidelines.

Acknowledgments

The authors gratefully acknowledge the contributions of our colleagues without whose support this project would not have been possible:

- Kathleen Whitmire, Director of School Services, American Speech-Language-Hearing Association
- Rob Mullen, Gretchen Gould and Andrea Castrogiovanni, National Center for Evidence-Based Practice in Communication Disorders, American Speech-Language-Hearing Association
- Anonymous reviewers for their insightful comments on earlier versions of this paper.

The development of this manuscript was supported in part by the Center for Personnel Studies in Special Education (COPSSE) funded by the Office of Special Education Programs (OSEP, U.S. Department of Education) located at the College of Education, University of Florida, Gainesville, Florida.

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Appendix A. Databases Searched and Search Terms Used

Databases:

Campbell Collaboration
Cochrane Database of Systematic Reviews
CINAHL
Education Abstracts
ERIC
Exceptional Child Education Resources
Health Source: Nursing
Linguistics and Language Behaviour Abstracts
Medline (CSA)
Medline (EBSCO)
Medline (PubMed)
Pre-CINAHL
PsycARTICLES
PsycINFO
Science Citation Index
ScienceDirect
Social Science Citation Index
What Works Clearinghouse

Search Terms:

- Language AND child*
- Language AND school-based and child*
- Language AND treatment AND child*
- Language AND (specific language impairment OR language disorders in children OR aphasic children OR specific language impairment in children OR specific language disability in children)
- Language AND (syntax OR (syntax AND semantics)) OR (grammatical morphemes OR morphemics OR agrammatism OR grammatical speech disorders OR speech disorder, grammatical) OR vocabulary/semantics OR pragmatics OR (narration AND expository text) OR phonological awareness OR comprehension
- (“Child language” OR “language research” OR “phonological awareness” OR “speech pathology”) AND (“control groups” OR “case studies”)
- (“Speech” OR “speech pathology” OR “language research”) AND “school”
- (“Language disorders in children” OR “phonological awareness”)
- (Speech-language pathology OR child language OR language development/disorders) AND (schools OR students)
- Language OR language development disorders OR language tests OR language therapy OR speech-language pathology OR language development OR rehabilitation of speech and language disorders OR child language

AND

- Randomized controlled trials OR cohort studies OR meta-analysis

AND

- School health services OR schools OR Students
- “Phonological Awareness” AND “Language” OR “Figurative Language” OR “Form Classes (Language)” OR “Phrases” OR “Sentences” OR “Vocabulary” OR “Language Delay” OR “Language Disorders”

AND

- “School Environment” OR “School Facilities” OR “Classrooms” OR “Educational Laboratories” OR “Learning Centers (Educational)” OR “Classroom Environment”

AND

- “Cohort Analysis” OR “Randomized Controlled Trials” OR “Single-Subject Designs"
- Language and education OR language awareness OR language attrition OR language awareness in children OR child language OR language disorders OR language disorders in children

OR

- Grammar OR comparative and general OR phonological awareness

Literature search was conducted from October to November 2005 by Gretchen Gould and Andrea Castrogiovanni. References were managed using the bibliographic database EndNote.

Appendix B. Key Features to Consider for Evaluating the Quality of Evidence from Individual Studies of Treatment (ASHA, 2004a)

Note: Studies categorized as Level 1 and 2 were included for review in the present article.

Level	**Design features**	**Bias control**	**Importance**	**Precision**	**Harm potential**
1	• Data-based, controlled, experimental, randomized, prospective (RCT) • Systematic reviews	Selection/group, measurement, analysis	Large effect size (ES), in and outside of therapy context	Narrow confidence interval (CI)	Minimal potential for any harm
2	• Data-based, controlled, nonexperimental, nonrandomized, prospective (cohort; cross-sectional) • Well designed single-subject designs with evidence of experimental control	Selection/group, measurement	Large ES in therapy context	Moderately narrow CI	Low potential for any harm
3	• Data-based, controlled, nonexperimental, nonrandomized, retrospective (case-control)	Selection/group, high interrater reliability	Medium ES in therapy context	Wide CI	Moderate potential for mild, short-term harm is outweighed by potential benefit
4	• Data-based, uncontrolled, nonexperimental, nonrandomized (case series/study)	No blinding; prospect of direct benefit to principal investigator	Small ES	No CI reported or calculable	Potential for serious, short-term harm outweighed by potential benefit
5	• No empirical data (opinion, belief, inductive logic)	No independent evaluation; conclusions may benefit those making assertions	No ES reported or calculable	—	Potential for serious, lasting harm not clearly outweighed by potential benefit

Appendix C. Overview of Distinguishing Features of Evidence Levels in Proposed Adaptation of the Oxford System for Evaluating Individual Studies of Treatment Efficacy (Oxford Centre for Evidence-Based Medicine, 2001)

A. Design characteristics

Design Level 1: Data-based, controlled, experimental, randomized, prospective (randomized clinical trials with parallel groups and crossover designs)

In a study at Design Level 1, the investigator actively compares (= controlled) two different treatment conditions that he or she has created (= experimental) by randomly assigning participants to conditions. In order to be experimental and randomized, all Level 1 studies are automatically prospective as well. There are two main kinds of Level 1 study designs: A parallel groups experiment is used to compare the outcomes of patients who have been randomly assigned to a treatment group or to a no-treatment group. Each participant is exposed to one treatment only. By contrast, in a crossover experiment two or more treatments are administered sequentially to randomized groups of participants, and each group receives exposure to both treatments in a different order.

A systematic review is an analysis of a number of related studies. In this case, the author of the systematic review selects the best RCTs from a thorough literature search and analyzes these in a way that allows for a summarization of findings across multiple experiments.

Design Level 2: Data-based, controlled, nonexperimental, nonrandomized, prospective (cohort and cross-sectional studies)

Level 2 studies include comparisons of treatment groups without random assignment. Another type of Level 2 investigation is a cohort study, which evaluates behavioral change in a number of participants who are receiving one kind of treatment in comparison with behavioral change in another group of participants who are receiving another kind of treatment. For example, an investigator may compare changes in language scores in a group of children who receive therapy three times per week in five school districts with changes in language scores in a group of children who receive therapy twice each week in five different school districts.

Most researchers in speech-language pathology also include multiple-baseline, single-subject design studies in Level 2. The main requirement of a single-subject design study is that each participant serves as his or her own control. One way this can be accomplished is by measuring two or more behaviors across alternating no-treatment and treatment phases. In this design, one behavior should improve when it is the focus of treatment while the other behavior remains stable. When the focus of treatment changes to the second behavior, it should improve. Systematic reviews of nonrandomized group studies, cohort studies, and single-subject design studies also fit into Level 2.

B. Control of subjective bias

Bias Control Level 1: Participant selection, group assignment, measurement, and analysis of results are conducted by examiners who are unaware of participant characteristics

Bias Control Level 2: Blinding at group assignment and measurement

C. Impact/importance of treatment

Importance Level 1: Large effect size within treatment context and evidence of generalization to external contexts/observers (e.g., social validity)

Importance Level 2: Large effect size within treatment context; generalization to other contexts unknown

D. Precision of results

Precision Level 1: Narrow confidence interval

Precision Level 2: Moderately narrow confidence interval

E. Potential for harm

Harm Level 1: Minimal potential for any harm is outweighed by potential benefit

Harm Level 2: Low potential for any harm is outweighed by potential benefit

Table 1. Syntax/Morphology

Citation	Participants	Research Design	Major Findings
Weismer, S., & Murray-Branch, J. (1989). Modeling versus modeling plus evoked production training: A comparison of two language intervention methods. *Journal of Speech and Hearing Disorders, 54,* 269–281.	Number of participants: 4 Age/grade: 5;5–6;11 (years;months) Disability: Specific language impairment (SLI) Three participants (A, B, D) were –1 standard deviation (*SD*) on production (mean length of utterance [MLU]; normed test); 1 participant (C) was –1 *SD* in both production and comprehension. Class placement: Students in public schools, also receiving service at university clinic Service provider: Investigator provided intervention.	Single-subject (alternating treatment design with baseline) Treatment targets Each participant had different grammatical targets as per a language evaluation. Participants:A: present progressive –ing, 3rd person singular –s, auxiliary "be" forms, copula "be" forms B: regular & irregular past tense, nominative case pronouns, auxiliary inversion for questions C: articles, present progressive –ing, 3rd person singular –s, auxiliary "be" forms, copula "be" forms D: articles, present progressive –ing, auxiliary "be" forms, copula "be" forms, prepositions (in, to, at) Therapy methods Treatment 1: Modeling (M) — focused models of target form provided by clinician; no verbal responses required from child; activities included storytelling, art construction activities, puppet play. Treatment 2: Modeling plus evoked production (MEP) — focused models of target form with intermittent opportunities for participant to produce the form and receive feedback regarding correctness of production; training environment structured to evoke spontaneous (non-imitative) productions of target form.	Dependent variables were number of correct productions of target grammatical form and total attempts at target form. No marked difference in outcome between modeling and modeling plus evoked production training for any participant. For the 3 participants with only production delay, both treatments were equally effective; experimental control demonstrated across participants from baseline to treatment phase (increase in use of specific targets). For the 1 participant with delay in both production and comprehension, neither treatment led to increase from baseline over 15 treatment sessions. Effect sizes (Percent nonoverlapping data [PND] for either treatment over baseline): Participant A PND = .83 (moderate) Participant B PND = 1.00 (very high) Participant C PND = .20 (ineffective) Participant D PND = .64 (mildly effective)

Table 1. Syntax/Morphology (cont.)

Citation	Participants	Research Design	Major Findings
Connell, P. & Stone, C. (1992). Morpheme learning of children with specific language impairment under controlled instructional conditions. *Journal of Speech and Hearing Research, 35*, 844–852.	Number of participants: 32 SLI; 24 age-matched and 20 language-matched controls Age/grade: 5;0–6;11 Disability: SLI; –1 *SD* on either MLU or normed language test. Classroom placement: Participants selected from caseloads of SLPs in schools and clinics, but no other breakdown described. Service provider: Assumed to be investigators, but not described	Level 2 cohort (split-plot factorial) Treatment targets Investigator-designed invented morphemes: one of four suffixes attached to concrete nouns capable of being represented by pictures, to indicate one of the following meanings (large/small, whole/part, whole/broken) (e.g., "TVum" to indicate a broken TV) Therapy methods Participants taught set of invented morphemes by computerized language teaching program (to standardize teaching procedures and minimize unintentional examiner bias). Modeling treatment: Participant heard morpheme being used in meaningful way but was not asked to repeat or use the morpheme in any way. Imitation treatment: Same as modeling with additional step of instructing participant to give a direction to a computer cartoon figure that contains the target morpheme. Participants received four computerized language-teaching sessions over 2-week period.	Dependent variables were pretest and posttest performance on both production and comprehension probes of invented morphemes. Modeling alone did not significantly increase SLI participants' use of morphemes; imitation training did result in SLI participants' increased performance for morpheme production. Both modeling and imitation training appeared equally effective for increasing SLI participants' performance on morpheme comprehension probes. However, results from study were confounded by large effects of order of treatment procedure (whichever treatment strategy administered first overrode any differential effect within the counterbalanced design). Effect sizes cannot be computed from data presented in article. No pre/post scores presented to measure treatment effectiveness.

Table 2. Semantics/Vocabulary/Concepts/Word-Finding

Citation	Participants	Research Design	Major Findings
McGregor, K. & Leonard, L. (1989). Facilitating word-finding skills of language-impaired children. *Journal of Speech and Hearing Disorders, 54,* 141–147.	Number of participants: 4 Age/grade: 9;1–10;5 Disability: All diagnosed as SLI; all students scored more than –1 *SD* on at least two normed tests of language and word finding Class placement: All enrolled in class for SLI students at their school. Service provider: Not specified but assumed to be investigator	Level 2 data-based cohort Two participants participated in 6 weeks of language therapy with word-finding focus; other 2 served as controls and participated in narrative and syntax activities. Nonrandom assignment of partici-pants to treatment and control groups. Controls matched on age and word-finding abilities. Treatment targets Investigator-designed elaboration strategies (to provide child with a richer knowledge of target words) and retrieval strategies (teach child to use information already known about target words) thought to aid word retrieval taught via a set of 120 concrete nouns capable of being represented by pictures. Therapy methods Elaboration strategy: Clinician presents pictures/words that rhyme with target word (phonemic) and pictures/words that are similar to and different from the target word (semantic). Retrieval strategy: Clinician presents retrieval cues related to target words (cues are: category membership, beginning sound, and customary location of the object/name). Treatment was 12 sessions, each 1 hr, with both elaboration & retrieval strategy training.	Dependent variables were number of errors on naming task; number of words recalled in free recall task On naming and recall tasks, treatment participants improved from pretest to posttest, while controls either made smaller gains or no gains. Performance on maintenance tasks, however, was sometimes lower than posttest for all groups. Data did not clearly indicate whether elaboration or retrieval training was more effective. Effect sizes cannot be computed from data presented in article. Difference scores for each participant are presented from pretest to posttest on number of errors on naming task; number of words recalled in free recall task.

Table 2. Semantics/Vocabulary/Concepts/Word-Finding (cont.)

Citation	Participants	Research Design	Major Findings
Wing, C. (1990). A preliminary investigation of generalization to untrained words following two treatments of children with word finding problems. *Language, Speech, and Hearing Services in Schools, 21*, 151–156.	Number of participants: 10 Age/grade: Range = 71–85 months, mean = 77 months; first grade. Disability: Identified by school as having severe language impairment. Class placement: All children were in self-contained class for language disabilities; intervention was provided in school. Service provider: Investigator was students' regular SLP.	Level 2 cohort Students divided into two groups: one received semantic treatment; the other received phonological treatment; not random assignment Each group received 30 group therapy sessions, each 25 min long, over 2.5 months Treatment targets Investigator-designed semantic or phonological strategies thought to aid word retrieval taught via set of vocabulary items similar to but not duplicating items on Test of Word Finding. Therapy methods Semantic treatment: Activities to improve elaboration and organization of semantic storage (put pictures/ words in categories; supply attributes; use categories and attributes to define words; explain function and attributes of objects). Phonological treatment: Activities for phonological segmentation (count syllables and phonemes, match and supply rhyming words); and activities for auditory imagery (hear picture name in their mind, silent verbal rehearsal).	Dependent variables were pretest and posttest scores on Test of Word Finding (TWF) Significant gains on TWF scores for phonological treatment group; nonsignificant gain for semantic treatment group, even though all participants but one (who was in semantic group) improved TWF scores from pretest to posttest. Effect sizes: Semantic treatment group: $d = .6$ (moderate) Phonological treatment group: $d = .7$ (moderate)

Table 2. Semantics/Vocabulary/Concepts/Word-Finding (cont.)

Citation	Participants	Research Design	Major Findings
Masterson, J., & Perrey, C. (1999). Training analogical reasoning skills in children with language disorders. *American Journal of Speech-Language Pathology*, *8*, 53–61.	Number of participants: 12 Matched 6 treatment to 6 controls (not randomly assigned; treatment volunteers expressed willingness to attend extra treatment sessions) Age/grade: Between 9 and 14 years (mean = 11;11) Disability: SLI Class placement: All receiving services for language in public schools or private schools Participants received treatment in small groups; assume in pullout school setting but not described. Service provider: Training administered by one investigator	Level 2 cohort Treatment targets Investigator-designed mediated learning and bridging strategies thought to aid in analogical reasoning (verbal analogy performance) taught via a set of verbal analogies from 5 categories (synonyms, antonyms, function, linear order, and category membership). Therapy method Phase 1 treatment: Mediated learning, which included direct instruction in component processes of analogical thinking (encoding, inferring, mappings, applying); Phase 1 treatment consisted of 8 sessions over 2 weeks. Phase 2 treatment: Bridging, which included exercises designed to help participants incorporate the component processes of analogical thinking into everyday activities; Phase 2 treatment consisted of 8 sessions over 2 weeks.	Dependent variable was performance on 100-item verbal analogies test (20 from each of the following categories: synonym, antonym, functional, linear order, category membership). None of specific analogies in pretest and posttest were used in treatment. Average gain made by students receiving treatment was 2.37 *SD*s more than participants who did not receive treatment (large effect size). Performance appeared to be consistent across all 5 semantic analogy categories. Direct instruction in analogical reasoning has positive effects in children with language disorders. No measure of generalization of trained strategies to classroom curricular activities. Effect sizes Treatment group d = 1.1 (large) Control group d = .02

Table 2. Semantics/Vocabulary/Concepts/Word-Finding (cont.)

Citation	Participants	Research Design	Major Findings
Crowe, L. (2003). Comparison of two reading feedback strategies in improving the oral and written language performance of children with language-learning disabilities. *American Journal of Speech-Language Pathology*, *12*, 16–27.	Number of participants: 12 Age/grade: Between 8 and 11 years Disability: Classified as having language-learning disabilities, scores of at least –1 *SD* on normed test of language; all were identified as "poor readers," scoring below 50th percentile on normed test of reading achievement. Class placement: Receiving special education services for language, learning, and reading problems Service provider: Intervention provided by the investigator at the children's school	Level 2 cohort (non-randomized controlled trial) Treatment targets Investigator-designed traditional reading decoding strategies or meaning-based Communicative Reading Strategies thought to aid oral language performance (e.g., receptive and expressive vocabulary performance). Therapy methods (and groups) T1: Traditional decoding feedback (student reads passage, sounds out words, answers questions after reading, and retells what was read; interventionist provided cues and feedback during reading [sound out, reread, provide word, divide word, phonemic cues]) T2: Communicative Reading Strategies (CRS); Interactive conversational style (student reads small portion of text, asking and answering questions during and after reading, commenting, summarizing, reacting to story events, and retelling what was read; interventionist provided cues and feedback during reading [preparatory set, summarize, explain, pronoun reference, cohesive ties]) Treatment groups received 2 group treatment sessions, each 1 hr long, per wk for 6 wks; Control group: No treatment	Dependent variables were pretest and posttest difference scores on the Gray Oral Reading Test—Revised (reading comprehension questions, oral reading rate/accuracy, and combined score) and on the Comprehensive Receptive and Expressive Vocabulary Test (CREVT) (normed test of expressive and receptive vocabulary; participants had to point to pictures and verbally define vocabulary items). Standardized measures of receptive and expressive vocabulary indicated that children in the CRS group performed better than children in either T1 or control group, but group differences were not statistically significant. All groups performed worse on posttest receptive and general vocabulary measures (an alternate form of the CREVT given as pretest); CRS group increased performance on alternate form expressive posttest, while T1 and control groups performed worse. Effect size: For the CRS treatment group's increase on expressive post-test: $d = .5$ (moderate)

Table 2. Semantics/Vocabulary/Concepts/Word-Finding (cont.)

Citation	Participants	Research Design	Major Findings
Throneburg, R., Calvert, L., Sturm, J., Paramboukas, A., & Paul, P. (2000). A comparison of service delivery models: Effects on curricular vocabulary skills in the school setting. *American Journal of Speech-Language Pathology*, *9*, 10–20.	Number of participants: 32 (who were eligible for S/L service out of 177 total students in 12 classrooms) Age/grade: Grades K–3 Disability: 13 eligible for speech services; 19 eligible for language services; criteria for placement was a score of –1 SD or greater on two normed tests of language, or one normed test of articulation. Class placement: Regular education classrooms Service provider: Students regular school SLP; classroom teachers; graduate students	Level 2 cohort (nonrandomized controlled trial) Treatment targets Meanings of a set of 60 vocabulary words from each classroom's general education curriculum. Therapy methods (a) Collaborative: SLP and classroom teacher collaboratively planned and implemented activities to target curriculum vocabulary words in classroom (large group vocabulary instruction and hands-on activities for topic units with embedded vocabulary words). (b) Classroom-based: Teacher and SLP independently planned and implemented vocabulary activities, similar to (a) above; SLP provided independent classroom lesson. (c) Traditional pullout: SLP provided vocabulary instruction for S/L impaired students in traditional pullout sessions averaging 50 min per week. SLP used same materials that were used in collaborative and classroom-based settings.	Dependent variables were pretest/posttest performance on 20-item vocabulary test (scores included points for adequacy of defining target word, using target word in a sentence, and recognizing definition of target word in multiple-choice format). Students who received services through a collaborative model had higher scores on curricular vocabulary tests than students who received services through a classroom-based or pullout model, though all 3 service delivery models were effective for teaching vocabulary. Effect sizes (a) Collaborative $d = 2.5$ (large) (b) Classroom-based $d = 3.5$ (large) (c) Traditional pullout $d = 1.2$ (large)

Table 2. Semantics/Vocabulary/Concepts/Word-Finding (cont.)

Citation	Participants	Research Design	Major Findings
Weismer, S., & Hesketh, L. (1993). The influences of prosodic and gestural cues on novel word acquisition by children with specific language impairment. *Journal of Speech and Hearing Research, 36,* 1013-1025.	Number of participants: 16 (8 SLI and 8 normal language) Age/grade: 5;1–6;7/ kindergarten Disability: Treatment group: SLI; controls: normal language Class placement: Treatment group: Self-contained classroom for children with severe language disorders in a public school kindergarten Controls: Regular kindergarten class Service provider: Assume investigator, but not stated	Level 2 cohort (repeated measures - groups by rate/stress/visual) Treatment targets Meanings of a set of 9 investigator-designed novel words (one-syllable, consonant/vowel/consonant forms with early developing sounds) representing either object labels or locatives. Therapy methods 3 experimental treatment conditions: Rate – stimulus sentences with target words presented at 3 rates (slow, normal, fast) Stress – target words presented with and without stress Visual – stimulus word presented verbally or verbally + visual cues (gestures)	Dependent variables were number of novel words comprehended and produced. For therapy group and controls, acquisition of novel words was affected by alterations in speaking rate and by the use of gestures accompanying spoken language, but not by stress manipulations. Slower presentation rate helped SLI performance as did addition of gesture cues. Effect sizes cannot be computed from data presented in article. Means and standard deviations are presented for comprehension and production of novel words by group for each of the 3 stimuli presentation conditions. No pre/post scores presented to measure treatment effectiveness.

Table 3. Phonological Awareness/Metalinguistics

Citation	Participants	Research Design	Major Findings
van Kleeck, A., Gillam, R., & McFadden, T. (1998). A study of classroom-based phonological awareness training for preschoolers with speech and/or language disorders. *American Journal of Speech-Language Pathology, 7,* 66–77.	Number of participants: 24 Disability: Speech and/or language disorder Age/grade: Preschool age mean = 48 months and prekindergarten mean = 60 months Class placement: Preschool and prekindergarten classrooms in a private school for children with language disorders Service provider: SLPs and graduate students in SLP	Level 2 cohort: nonrandomized comparison of treatment groups with a group of older children who had attended the same classrooms (without the phonological awareness treatment) the previous year Treatment targets Rhyming: rhyme identification, rhyme judgment, and rhyme generation Phoneme awareness: matching and identifying initial sounds, generating words, phoneme blending, and phoneme segmentation Therapy methods Children in the 2 treatment groups received rhyming instruction during the fall semester and phoneme awareness instruction during the spring semester.	Both treatment groups made significant improvements in rhyming and phoneme awareness. Gains in rhyming fell below the lower boundary of the 95% confidence interval of the control group, suggesting that the development in rhyming was not dependent on treatment. However, gains in phoneme awareness were above the upper limits of the control group's confidence interval, suggesting that training contributed to improvements in phonemic awareness. The children in the treatment groups performed better on the phonological awareness tasks than older kindergartners and first graders who had previously attended the pre-K class. Effect sizes *d* (preschool vs. control) = 1.58 (large) *d* (pre-K vs. control) = 1.76 (large)

Table 3. Phonological Awareness/Metalinguistics (cont.)

Citation	Participants	Research Design	Major Findings
Gillon, G. (2000). The efficacy of phonological awareness intervention for children with spoken language impairment. *Language, Speech, and Hearing Services in Schools, 31*, 126–141.	Number of participants: 91 Age/grade: 5;6–7;6 Disability: Speech and language disorder Class placement: Pullout services in clinic and school settings compared to classroom consultation or classroom instruction Service provider: SLPs and graduate students in SLP	Level 2: nonrandomized (matched) assignment to treatment and control groups compared with a cohort of typically achieving children Treatment targets Experimental Group: identification of phonological similarities, phoneme manipulation, sound identification, phoneme segmentation, grapheme-phoneme correspondence, phoneme production Traditional Control: phoneme production in isolation, syllables, words and phrases Therapy methods 4 groups: 1. Experimental Intervention – Gillon phonological awareness training program 2. Traditional Control – Van Riper speech therapy 3. Minimal Intervention 4. Classroom Consultation –normal comparison	Children in Group 1 made more improvement on tests of phonological awareness and reading than children in Groups 2 and 3. At the end of the study, the phonological awareness performance of the children in Group 1 was similar to the normal controls. Effect sizes were not supplied by the author and could not be computed because means and standard deviations were not provided.

Table 3. Phonological Awareness/Metalinguistics (cont.)

Citation	Participants	Research Design	Major Findings
Gillon, G. (2002). Follow-up study investigating the benefits of phoneme awareness intervention for children with spoken language impairment. *International Journal of Language and Communication Disorders, 37*, 381–400.	Number of participants: 20 of the original 23 SLI and all the normal controls Age/grade: 5;6–7;6 Disability: Speech and language disorder Class placement: Pullout services in clinic and school settings compared to classroom consultation or classroom instruction Service provider: SLPs and graduate students in SLP	Level 2: nonrandomized (matched) assignment to treatment and control groups compared with a cohort of typically achieving children Treatment targets Same as Gillon, 2000 Therapy methods 4 groups: Same as Gillon (2000) Tested 11 months later on phoneme awareness, reading, and spelling	Treatment led to sustained growth in phoneme awareness and word recognition. The majority of the children were reading at or above age-level expectations and improved on nonword spelling. Effect sizes Means and standard deviations were not provided for the phoneme awareness measure but were provided for the word recognition measure. *d* (SLI, pre- to follow-up) = 2.42 (large) *d* (Controls, pre- to follow-up) = 1.52 (large) *d* (SLI vs. controls at follow-up) = .64 (moderate)
Blischak, Shah, Lombardino, & Chiarella (2004). Effects of phonemic awareness instruction on the encoding skills of children with severe speech impairment. *Disability and Rehabilitation, 26*, 1295–1304.	Number of participants: 3 Age/grade: 5;6–7;6 Disability: Severe speech impairment with concomitant language disorder Class placement: Not stated Service provider: SLPs	Multiple-baseline single-subject design across behaviors and participants Treatment targets Phoneme-grapheme correspondence, phoneme segmentation, phoneme manipulation, pseudo word spelling Therapy methods Treatment – Phoneme-grapheme instruction and phonemic awareness instruction	Phoneme-grapheme correspondence and phonemic awareness instruction increased the encoding skills of 2 of the 3 participants and generalized these skills to untrained pseudo- and real words. Effect sizes (Percent nonoverlapping data [PND] for either treatment over baseline): Phoneme manipulation – moderate PND, 85% of probes in instruction phase were above baseline levels. Encoding – large PND, 98% of probes in instruction phase were above baseline levels.

Table 4. Computer-based Language Intervention

Citation	Participants	Research Design	Major Findings
Cohen, W., Hodson, A., O'Hare, A., Boyle, J., Durrani, T., McCartney, E., et al. (2005). Effects of computer-based intervention through acoustically modified speech (Fast ForWord) in severe mixed receptive-expressive language impairment: Outcomes from a randomized controlled trial. *Journal of Speech, Language, and Hearing Research, 48,* 715–729.	Number of participants: 60 Age/grade: 6–10 years Disability: mixed (receptive/expressive) language impairment Class placement: Regular classroom plus pullout for language therapy Service provider: Computer plus school clinicians	Level 1: RCT Treatment targets FFW-L: discrimination of tones, phonemes, syllables, and words; memory for commands; comprehension of grammatical morphology and complex sentences Other computer programs: listening, spelling, phonological awareness, reading, writing, vocabulary, problem solving, narration, syntax, and morphology Therapy methods 3 groups: 1. Fast ForWord–Language (FFW-L) 2. Other computer programs 3. Control (school therapy services only)	Similar gains on Clinical Evalution of Language Fundamentals, Third Edition, for the treatment and control groups at 9-week and 6-month follow-up periods. Suggests that the computer intervention plus school therapy was no more effective than school therapy alone. Effect sizes: 9 weeks: *d* = -.09 for FFW vs. Control (no effect) *d* = .27 for FFW vs. Computer (small) 6 months: *d* = .05 for FFW vs. Control (no effect) *d* = -.27 for FFW vs. Computer (small)

Table 4. Computer Language Instruction (cont.)

Citation	Participants	Research Design	Major Findings
Tallal, P., Miller, S., Bedi, G., Byma, G., Wang, X., Nagarajan, S., et al. (1996). Language comprehension in language-learning impaired children improved with acoustically modified speech. *Science, 271*, 81–84.	Number of participants: 22 Age/grade: 5;2–10;0 Disability: mixed (receptive/expressive) language impairments Class placement: Unknown Service provider: Computer games and trained clinicians	Level 2 : nonrandomized (matched) comparison of treatment and control groups Treatment targets Speech discrimination and on-line language comprehension Therapy methods Treatment group – early versions of FFW-L games (block commander, phonic match, phonic word, and language comprehension builder with modified speech stimuli) Control group – Computer versions of these same tasks without modified speech stimuli	Participants in the experimental group showed significantly larger improvements on measures of speech discrimination, language processing, and grammatical comprehension. Effect sizes were not reported and cannot be calculated because means and standard deviations were not provided.
Gillam, R., Crofford, J., Gale, M., & Hoffman, I. (2001). Language change following computer-assisted language instruction with Fast ForWord or Laureate Learning Systems software. *American Journal of Speech-Language Pathology, 10*, 231–247.	Number of participants: 4 Age/grade: 6–8 years Disability: SLI Class placement: Regular classroom plus pullout SLP services Service provider: Research assistants	Level 2: multiple-baseline single-subject design Treatment Targets FFW-L: discrimination of tones, phonemes, syllables, and words; memory for commands; comprehension of grammatical morphology and complex sentences Laureate Learning software: comprehension and memory of words, grammatical morphemes, sentences, and stories. Therapy methods Two children received FFW-L, 2 other children received a group of language games produced by Laureate Learning Systems (LLS)	All 4 children made clinically significant gains on the Oral and Written Language Scales. Both children who received the LLS games and 1 of the 2 children who received FFW-L made clinically significant gains on MLU computed from language samples. Effect sizes (for MLU): FFW d = .39 (small) and 1.37 (large) LLS d = .99 (large) and 1.7 (large)

Table 4. Computer Language Instruction (cont.)

Citation	Participants	Research Design	Major Findings
Merzenich, M., Jenkins, W., Johnston, P., Schreiner, C., Miller, S., & Tallal, P. (1996). Temporal processing deficits of language-learning impaired children ameliorated by training. *Science, 271*, 77–80.	Number of participants: 22 Age/grade: 5;2–10;0 Disability: mixed (receptive and expressive) language impairment Class placement: Unknown Service provider: Computer games	Level 2: nonrandomized (matched) comparison of experimental and control groups Treatment targets Perceptual identification of tone sequences and phoneme recognition Therapy methods Experimental group received FFW-L games: Circus Sequence and Phoneme Identification	The students in the experimental group improved on the Tallal Repetition Test (a measure of auditory temporal processing), but the students in the control group did not. Effect sizes were not reported and cannot be calculated because means and standard deviations were not provided.
Seger, E., & Verhoeven, L. (2005). Computer-supported phonological awareness intervention for kindergarten children with specific language impairment. *Language, Speech, and Hearing Services in Schools, 35*, 229–239.	Number of participants: 36 Disability: SLI Age/grade: 4;6–6;11/kindergarten Class placement: Special schools for children with SLI in the Netherlands Service provider: Computer games	Level 2: nonrandomized (matched) comparison of 2 experimental groups and 1 control group Treatment targets Rhyming and phoneme synthesis Therapy methods Group 1 – 10 Rhyming and Sound Synthesis computer games with normal speech Group 2 - 10 Rhyming and Sound Synthesis computer games with modified speech (slower and amplified formant transitions) Control Group – Vocabulary computer games All children received 14 sessions, 15 min long, across 5 weeks	Positive treatment results were found for Experimental Group 1 when the phonological awareness task results were combined into difference *z* scores. The positive results were no longer significant 18 weeks after completion of the intervention. Effect size: The effect size of treatment for Experimental Group 1 compared with the control group: $d = 0.29$ (small)

Table 5. Pragmatics/Conversation/Discourse/Narratives

Citation	Participants	Research Design	Major Findings
Beilinson, J., & Olswang, L. (2003). Facilitating peer-group entry in kindergartners with impairments in social communication. *Language, Speech, and Hearing Services in Schools*, *34*, 154-166.	Number of participants: 3 Age/grade: 5;6–6;3/kindergarten Disability: "Social communication deficits" identified by SLP and teachers based on observation and comparison with normal peers; also, scores on normed language tests (range from -2 *SD* to "average" on Peabody Picture Vocabulary Test, Test of Language Development) Class placement: Full-day integrated classroom in university lab school Service provider: Second-year master's student in speech-language pathology and teacher in classroom	Single-subject (multiple baseline across subjects) Treatment targets Investigator-designed peer-group entry behaviors (general and specific statements to peers, and use of desirable toys as entry props), and investigator-designed steps in a peer-group entry sequence taught via a set of Meyer-Johnson picture symbols. Therapy methods Direct instruction in use of high-risk entry behaviors (general and specific statements to peers) and use of props (desirable toy) to gain entry. Direct instruction included use of Mayer-Johnson symbols for steps in an entry sequence (e.g., watch your friend, get a toy like your friend is using, do the same thing as your friend, tell an idea). Teachers were instructed to prompt students to use entry sequence in classroom. Treatment lasted 3 to 5 weeks for each participant.	Dependent variables were frequency of low- and high-risk entry behaviors; frequency of prop use; investigators also measured frequency of solitary vs. cooperative play. Experimental control demonstrated for the intervention across all participants between baseline, treatment, and withdrawal phases. Effect sizes: For participants between baseline and treatment, and treatment and withdrawal High-risk entry: All 3 students increased frequency of high-risk entry behaviors: *d* from 2.2 to 4.5 (large) Prop use: All 3 showed increase in prop use: *d* from 2.5 to 10.2 (large) Cooperative play: All 3 showed increase in frequency of cooperative play: *d* from 1.5 to 13.2 (large)

Table 5. Pragmatics/Conversation/Discourse/Narratives (cont.)

Citation	Participants	Research Design	Major Findings
Bedrosian, J., & Willis, T. (1987). Effects of treatment on the topic performance of a school-age child. *Language, Speech, and Hearing Services in Schools, 18,* 158–167.	Number of participants: 1 Age/grade: 60 months/kindergarten Disability: SLI; expressive syntax at Brown's Stage 4; only 2 of Brown's 14 morphemes mastered (*ing*, *on*); few topics initiated spontaneously, and limited to "here and now" Class placement: Regular kindergarten class Service provider: Not specified	Single subject (multiple baseline across behaviors) Treatment targets Increase in frequency of topic initiations in child/clinician conversation related to memory (past events), and topic initiations related to future events. Therapy methods Two 30-min therapy sessions per week for 6 months. Treatment: Direct instruction, modeling and feedback within a communicative context; for past topics, clinician modeled using appropriate grammatical markers (e.g., what we did yesterday), direct/indirect requests to elicit comments from child, and visual sequence cards. Similar procedures used to increase frequency of future topics.	Dependent variables were number of here/now topic initiations, past/memory topic initiations, and future topic initiations in 5-min probe sessions. Experimental control and effectiveness of treatment demonstrated across behaviors. Increase in the frequency of past topic initiations, even though the absence of toys was related to number of past topics, thus confounding the interpretation. Increase in the frequency of future topic initiations. Also, increase in participant's use of appropriate syntactic forms to mark past and future topics, as well as a general increase in syntax level and use of Brown's morphemes. Effect sizes: Past topics d = .6 (moderate) Future topics d = 1.5 (large)