Differentiated Instruction to Support High-Risk Preschool Learners

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Abstract

Differentiated instruction is a strategy for meeting the needs of diverse learners. In this paper, I describe a differentiated instruction model and examine the effects on high-risk children. One hundred twenty-eight children and their teachers from eight Head Start classrooms participated in this study. Teachers provided developmentally sequenced, bi-level instruction in small group formats. Children made gains on all areas assessed (vocabulary, emergent reading, alphabet knowledge, print concepts, phonological awareness, emergent math). A sub-group of higher-risk children was defined as those who scored in the bottom 5th percentile on English vocabulary at the start of the school year. This higher-risk group comprised 26% of the sample. Higher-risk children made much larger gains on vocabulary over the course of the year than did their lower-risk classmates and showed similar or slightly lower rates of change on other measures of early academic skills. Practical issues relating to the implementation of a differentiated instruction model are discussed.

High-Risk Preschool Learners

Inequality in educational opportunities and outcomes as a function of poverty, parent education, ethnicity, and native language status remains a shameful fact of American life and these educational disparities exist even for our youngest citizens. Preschool attendance strengthens early academic skills and the benefits of preschool may be stronger for at-risk children (Magnuson, Meyers, Ruhm & Waldfogel, 2004). However, preschool *quality* is a key issue; only programs of exceptionally high quality are likely to result in long-term reductions in academic disparities (Magnuson & Waldfogel, 2005). Initiatives such as Early Reading First were developed with the goal of significantly improving the quality of curriculum and instruction provided to at-risk preschool children in order to close the readiness gap.

Even within high-risk populations there is considerable variation in terms of children's school readiness and rates of progress in the classroom over time. However, relatively little attention has been paid to the issue of achievement disparities within at-risk populations. The relevant data do not present a clear picture. Molfese et al. (2006) found that half of low-SES four-year-olds in a compensatory preschool program made no gains in alphabet knowledge over the school year. These children started the school year with low assessment in all domains and showed little benefit from being in preschool, thus suggesting that the Matthew effect operates even within a high-risk sample. The FACES 2000 study (Administration for Children and Families, 2003) shows the opposite pattern—here the poor got richer and the rich got poorer. In the FACES sample Head Start children who started the school year in the lowest quartile made larger gains on vocabulary, alphabet knowledge and math than did their peers in the highest quartile. In fact, children in the highest quartile showed declines over the year on standardized scores. Finally, Kaplan and Walpole (2005) reported results for kindergarten children using

ECLS-K data. They found that 38% of children from families living below the poverty line entered kindergarten with minimal knowledge of the alphabet or phonological awareness. More disturbing, 63% of these children with low fall scores failed to make gains during the kindergarten year. Unfortunately, these studies do not provide a clear answer concerning which low-SES children are at risk for falling further and further behind. But they do indicate that current educational practices are not providing many at-risk children with the support they need.

Differentiated Instruction

Children come to preschool with different home experiences, cultural backgrounds, readiness skills, interests, and learning styles. Because of this, children learn at different rates and may need different kinds of instructional strategies. According to Tomlinson (2000):

> Differentiation consists of the efforts of teachers to respond to variance among learners in the classroom. Whenever a teacher reaches out to an individual or group to vary his or her teaching in order to provide the best learning experience possible, that teacher is differentiating instruction. (p. 1)

In a differentiated instruction model, all children are taught using the same curriculum and learning standards. However, children may be taught using different materials, learning activities, or levels of teacher scaffolding. Children may also be allowed to show their understanding in different modes or formats. Hallmarks of differentiated instruction include small group teaching, flexible grouping, and continuous performance assessment to guide instructional modifications (Tomlinson, 2000; Tomlinson & McTighe, 2006). Research conducted with K-12 learners indicates that differentiated instruction improves children's motivation and achievement (Tomlinson & McTighe, 2006). As Purcell and Rosemary (2008) point out, differentiated instruction is integral to developmentally appropriate practice.

Furthermore, when differentiated instruction is skillfully conducted, all children are taught within their zone of proximal development (Vygotsky, 1978).

The purpose of this paper is to describe a differentiated instruction model used in an Early Reading First project and to examine the effects on at-risk preschool learners. Since the project was conducted in Head Start classrooms, all children were at educational risk due to socioeconomic factors. However, within this low-SES group, we identified a sub-group of children who were especially vulnerable based on low pretest vocabulary scores. We compared outcomes for this particularly high-risk group with those of their classroom peers. In our discussion section, we examine challenges that would need to be addressed in using our differentiated instruction model in typical preschool programs serving at-risk children. We also suggest directions for future research.

Methods

Participants

Data reported here are from project year three of the *Learning Connections* Early Reading First (ERF) project, which started in the fall of 2005. Participating classrooms were from the same Head Start program, although sites were located across the island of O‘ahu. Five classrooms followed a traditional Head Start calendar and three classrooms followed a full-day, year-round schedule. On the average, lead teachers had over 16 years of teaching experience and most had a bachelor’s degree (88%). Assistant teachers had an average of 9.4 years in the field. Most assistant teachers had a high school diploma (40%) or a diploma plus a CDA (40%); 20% had a bachelor’s degree.

Results are presented for the 128 children with complete pre- and posttest data. At the start of the school year, children ranged in age from 32 to 55 months, with a mean age of 43.9

months. Slightly more than half of the children (57%) were kinderbound. There were more boys (58%) than girls (41%). Slightly more than half the children (56%) were Native Hawaiian, 14% were of other Pacific Island heritage, 26% were Asian American, and less than 2% each were White, African American, or Native American. About one-third of children (35%) were English language learners (ELLs). Nineteen different foreign languages were spoken in children's homes; the more prevalent languages were Chinese dialects, Filipino dialects, and various languages from Micronesia (e.g., Chuukese, Marshallese, Pohnpean). Six percent of children had diagnosed special needs and 19% were referred for evaluation during the school year.

Curriculum

Classrooms implemented the *Learning Connections* (LC) curriculum as an enhancement to the *Creative Curriculum* (Dodge, 2002). LC is an experimentally-validated enrichment curriculum that that focuses on emergent literacy and emergent math (DeBaryshe & Gorecki, 2005; DeBaryshe & Gorecki, 2007; Sophian, 2004). The LC curriculum addresses seven learning domains: Oral language, phonological and phonemic awareness, alphabet knowledge and print concepts, emergent writing, numbers and operations, geometry and measurement. A series of weekly home learning activities is also provided to families, to allow children to build on what they have been learning at school. Hallmarks of LC include an emphasis on (a) small-group instruction, (b) developmental sequencing, and (c) differentiated instruction through the use of bi-level lesson plans and activity modifications.

Differentiated instruction

Unlike other groups in this symposium, we did <u>not</u> provide extra instructional time to the most high risk children. Rather, we followed a differentiated instruction model in which each child was taught within his or her zone of proximal development. Within each of the seven LC

curriculum domains learning activities are developmentally sequenced. Ideally, instruction for each child would be individualized to the extent that he or she would start at the appropriate place in the sequence for each curriculum domain, and progress through the sequence at a challenging, but appropriate pace. We expected that it would be difficult for teaches to achieve this ideal level of individualization. We attempted to approach this ideal by using the following differentiation strategies.

Flexible small group instruction. Teachers established flexible small learning groups (suggested group size was 3-4 children) with similar skill levels. Teachers varied the size of the group depending on the needs of the children involved and the particular activity. One-on-one and 1:2 formats were used most often for children who were easily distracted, had minimal English proficiency, or had special learning needs.

Bi-level lesson plans. Lessons plans were developed on a monthly basis. Although we had an expected scope and sequence of lesson plans for the school year, where we started in the sequence and rate of progress through the sequence was based on child assessment data and teacher input. Children in Level 1 (developmentally less advanced) and Level 2 (more advanced) followed different lesson plans. Level 2 children (29% of all children) were older on the average than level 1 children, and were more likely to be returning students participating in the project for the second consecutive year. Both lesson plans addressed the same learning domains, but each level had different specific small group activities that addressed different levels of complexity in the developmental sequence.

For example, at the start of the school year, the numbers and operation activity for Level 1 children might involve one-to-one correspondence, while Level 2 children might work on creating sets of five to ten objects. The phonological awareness activity for Level 1 might

involve segmenting compound words or clapping out words of 1-3 syllables. Level 2 children would work on a more advanced phonological awareness activity, such as going on a scavenger hunt for objects that start with one of two different target phonemes and sorting their treasures according to the initial sound.

Activity variations. Each LC activity was designed to be offered at different levels of complexity. The curriculum manual included detailed suggestions for modifying each activity to make it either more or less challenging while still addressing the core learning outcome. Teachers could use any variation of the core lesson they felt was most suitable for their small group of children; they could also use different variations for different children within the same small group.

Activity options within a level. As the school year progressed, we found that some children were well ahead of or behind their small group peers on particular skills areas. When this situation arose, we provided teachers with options within the day's level 1 and level 2 lesson plans. For example, there might be two choices of phonological awareness activities for the level 2 children. Most level 2 children would sort objects by first sounds, while a smaller number who had strong phoneme-level skills and alphabet knowledge could work with moveable letters to create CVC words.

Measures

Children were assessed at the start and end of the year by trained assessors on the: 1) *Peabody Picture Vocabulary Test, Third Edition* (PPVT) (Dunn & Dunn, 1997), 2) *Test of Early Reading Abilities, Third Edition* (TERA) (Reid, Hresko, & Hammill, 2001), 3) *PALS-PreK* (PALS) (Invernizzi, Sullivan, Meier & Swank, 2004), and 4) mathematical operations and logical reasoning scale of the *Developing Skills* Checklist (DSC) (CTB/McGraw-Hill, 1990).

Teachers administered two progress monitoring measures designed for the LC curriculum. The *LC Probe* is a short performance measure that covers basic literacy and math skills. The LC Probe was used to make the initial assignment of children to Level 1 or Level 2 small groups. The *LC Child Observation Record* (LC-COR) is a curriculum-based assessment rubric used to document children's progress on curriculum goals. LC-COR scores correlate in the range of .11 - .52 with the different components of our standardized test battery, with most correlations being .4 and higher.

Analysis and Results

Post-hoc definitions of risk group

For the purpose of this paper, a risk status classification was developed based on pretest score on the PPVT. The *higher-risk* group was defined as those who had a standard score of 75 or less at pretest; this represents the bottom 5% based on national norms. Thirty-three children (26%) met the higher-risk criterion. The *lower-risk* group consisted of the remaining classroom peers, i.e., those children with PPVT pretest scores greater than 75. Risk status was not evenly distributed across classrooms ranging from 6% to 44%. The division of children into higher- and lower-risk groups was a post-hoc analysis. Unlike several of the other papers in this symposium, we did not deliver additional or different instruction to our higher-risk group. Instead, all children received the same dosage of differentiated instruction.

Children in the higher-risk and lower-risk groups were similar on most demographic characteristics. However, higher-risk children were much more likely to be English language learners (72% vs. 22%, $\chi^2 = 27.96$, $df = 1$, $p < .0005$). Higher-risk children scored significantly lower than their lower-risk peers on the PPVT and all other pretest assessment measures. All but

two of the higher-risk children had been assigned to Level 1 small groups; overall, higher-risk children comprised one-third of the level 1 instructional group.

Progress Monitoring Measures

Results for the LC-COR are shown in Table 1. By the end of the school year, higer-risk children were exposed to fewer literacy and math activities than were their lower-risk peers (although the difference for the total number of literacy activities was only marginally significant). Higher-risk children also showed lower levels of competence on the activities to which they were exposed, as indicated by a lower percentage of activities rated by their teacher as being at the intermediate or mastery levels of proficiency. In other words, the higher-risk children moved through a smaller portion of the curriculum sequence and were less likely to master the subject matter to which they were exposed.

Insert Table 1 about here

Child Assessment Battery

Data from the standardized assessment battery were analyzed using a series of 2 (higher-risk vs. lower-risk) by 2 (pre vs. post) analysis of variance models. Results are shown in Table 2. A significant group effect indicates that the lower-risk group out-performed the higher-risk group, aggregated across time periods. A time effect indicates that children's scores (aggregated across the higher- and lower-risk groups) increased over time. A group x time interaction indicates that the rate of change from pre to post was different for the higher vs. lower-risk groups. The magnitude of these effects is expressed as partial eta-squared which represents the

proportion of variance in overall scores accounted for by group, time, and the group x time interaction, respectively.

Insert Table 2 and Figures 1 and 2 about here

On all measures, the lower-risk group scored higher than the higher-risk group, and children's scores in both groups improved over time. Of more interest are the findings for the group x time interactions. These interactions are shown graphically in Figures 1 and 2. For the PPVT, growth over time was steeper for the higher-risk group; the higher-risk children started with much lower scores, and showed larger average gains (roughly 15 vs. 4 points, respectively). The groups did not show differential growth on the PALS alphabet knowledge or print concepts. There was a non-significant trend in the direction of greater growth for the lower-risk children (i.e., $p < .09$) on the TERA, PALS phonological awareness and DSC.

In summary, the higher-risk group started the school year with lower scores on all assessment measures. The higher-risk group showed greater gains over time on the PPVT and the magnitude of this change was quite large, about 1 standard deviation. Results for other outcomes showed some evidence of greater gains by the lower-risk group. However, these differences were modest in magnitude and did not reach traditional levels of statistical significance.

In addition to knowing the magnitude of the gains that children made over the school year, it is important to know whether they attained desired levels of proficiency or whether they still fell below performance benchmarks at the posttest period. Federal ERF accountability standards define age-appropriate performance on the PPVT as a standard score of 85 (the 16th

percentile) or higher. We used this benchmark for both the PPVT and TERA. For the DSC, we used a normal curve equivalent score of 28 (equivalent to the 16th percentile) or higher. For the PALS sub-test benchmarks we used the spring developmental ranges provided in the PALS manual.

Results for the benchmark data are shown in Figure 3. Despite the large average gains made by the higher-risk group, only 21% of high-risk children met the PPVT posttest benchmark, compared to 84% of the peer group. On five benchmarks (PPVT, TERA, letter names, print word awareness, DSC) a significantly larger percentage of lower-risk children met the benchmark threshold, based on chi-squared tests. For rhyme and beginning sounds, there was a nonsignificant trend ($p < .09$) favoring the lower-risk group. And for letter sounds and name writing, group comparisons were nonsignificant.

Insert Figure 3 about here

Individual Differences Within the High-Risk Group

Within the higher-risk group, children showed different rates of progress. Sixteen of the higher-risk children (48%) had posttest PPVT scores above 75; these "large gainers" no longer met the criteria for membership in the higher-risk group at the end of the school year. On average, children who moved out of the higher-risk group gained 21.23 points on the PPVT as compared to an average gain of 9.40 points for children who still met the higher-risk criterion at the end of the school year ($F = 6.61$, $df = 1, 31$, $p < .02$).

What distinguished the large gainers from the children who remain at high risk? The larger gainers started off at less of a disadvantage; they had higher pretest scores on the PPVT

(*M*s = 63.82 vs. 54.87, $F = 4.31$, $df = 1, 31$, $p < .05$), PALS print concepts (*M*s = 3.29 vs. 1.62, $F = 4.58$, $df = 1, 31$, $p < .04$), and DSC (*M*s = 6.94 vs. 3.44, $F = 5.78$, $df = 1, 31$, $p < .003$). The large gainers were less likely to be English language learners (37% vs. 89%, respectively, $\chi^2 = 6.92$, $df = 1$, $p < .01$). Their parents were more likely to read aloud to them at home (an average of 1.49 books per week vs. 0.70, $F = 5.76$, $df = 1, 31$, $p < .02$) and had a non-significant trend towards completing a higher percentage of the LC home learning activities (71% vs. 49%, $F = 3.83$, $df = 1, 31$, $p < .06$).

Discussion

The differentiated instruction model used in our ERF project appears to be a promising approach to promoting early academic skills for the full range of children who attend Head Start. Children in our higher-risk group (i.e., those who started the year with very weak English vocabulary skills) made impressive progress in this target area, achieving a steeper rate of change than their classroom peers. The higher-risk children also made gains on emergent literacy and math skills, showing rates of change that were similar to, or only slightly less than their peers Although the higher-risk children made statistically significant gains, most did not reach benchmark levels of performance by the end of the school year. It may be unrealistic to expect that achievement gaps can be erased after only one or two years of preschool participation (Magnuson & Waldfogel, 2005). Eliminating achievement gaps may be especially difficult for young English language learners, who typically do not acquire the English fluency required for full classroom participation before third grade (Ballantyne, Sanderman, D'Emilio & Mclaughlin, 2008). While it is necessary to hold high expectations for all children, it is also important to have well-grounded information on how much change can reasonably be achieved through early education alone, particularly if high-risk children transition into low quality K-12 settings.

Research issues

Our project did not include a control group, so we cannot clearly attribute the gains we saw to either our ERF project as a whole or to particular project components. Can we conclude that differentiated instruction was especially effective in promoting vocabulary growth for our higher-risk children? Regression to the mean is a statistical phenomenon that complicates the interpretation of pre- and posttest data. Our finding that our higher-risk children showed much greater gains on the PPVT is consistent with regression to the mean. However, we did not find this same pattern on the other assessment measures, which suggests that our results for the PPVT were not a statistical artifact. Defining and measuring successful differentiation is a complex task. Another limitation of our study is that our fidelity measure of the quality of differentiation was fairly basic, has not been validated, and was collected at the classroom level. Thus, our classroom process data do not clearly indicate whether children's individual instructional needs were truly being met.

There is a clear need for research that refines and tests models of differentiated instruction for preschool settings. The goal would be to develop a set of practical strategies that benefit children across the spectrum of risk found in typical preschool settings. As a first step, we need clear operational definitions and validated measures of differentiation strategies. Smaller-scale studies could then demonstrate the conditions under which teachers implement differentiated instruction with high fidelity. For example, consistent use of progress monitoring tools appears to be a challenge; support strategies could include setting a dedicated time to complete these assessments or enlisting the center director or other support staff as additional assessors. Multiple baseline studies could show whether providing feedback on observed differentiation strategies increases teachers' use of target behaviors, and whether these new

teaching behaviors maintain over time or transfer occurs to additional differentiation techniques that were not the original target of intervention. Such feasibility studies can identify the setting conditions under which effective differentiated instruction is likely to occur. The next step would be to conduct randomized experiments (i.e., efficacy studies) to compare teacher practices and child outcomes in classrooms that use the same curriculum but differ on the use of differentiated instruction. Should these results look promising, the final step would be to implement large-scale field trials (i.e., effectiveness studies) to ascertain whether differentiated instruction still yields positive results across the range of real-world teachers and programs.

Practical considerations

Differentiated instruction is not easy to do. Purcell & Rosemary (2008) describe some of the challenges to using differentiated instruction in preschool settings. First, teachers must be well versed concerning appropriate learning goals and the developmental sequencing of target skills. Second, teachers must be good observers and be able to use ongoing assessments of each child's learning as the basis of their instructional planning. Third, teachers must be able to appropriately scaffold their interactions with children, providing different levels of support as needed. Finally, environmental design and classroom management techniques need to be used to their full advantage, so that children can independently engage in meaningful activities during those times that the teacher is involved in small group instruction.

Based on our own experience we foresee four likely issues. The first relates to the collection of progress monitoring data. Our teachers did not complete the ongoing progress monitoring measure as often as we asked. Updating the LC-COR on a daily, weekly, or even monthly basis was burdensome, even though teachers felt better informed about each child's progress when they did keep this information up to date. This made the LC-COR data less

valuable for lesson planning. The regularity of progress monitoring varied across classrooms and appeared to be a function of teacher buy-in. Perhaps not coincidentally, children's gains were largest on all outcome measures in the two classrooms that faithfully completed the LC-COR.

A second challenge we faced was meeting the needs of our ELL children. The children in our classrooms were quite linguistically diverse, but their teachers were not. In most cases, teachers were not able to differentiate instruction by using ELL children's native language. We provided training on instructional strategies for dual language learners (Restrepo & Dubasik, 2008), but fell far short of delivering best bilingual education practices.

The third challenge we anticipate is that a focus on small group instruction will require procedural changes for many classrooms. National data indicate that the typical preschool child spends 23% of his or her day in teacher-led, whole group instruction, but only 6% of the day in a small group instruction setting (FPG Child Development Institute, 2005). Small group formats and multi-level lesson plans require more time to prepare and implement than does a schedule that relies on large group, non-differentiated activities. Our teachers often felt pressed for time and/or that they neglected aspects of the holistic curriculum such as time for art and creative expression. This stress was especially pronounced in half-day classrooms. Teachers would prefer to do only 1-2 small group activities per day, but it is unlikely that this low level of intensity would provide enough focused teacher-child interaction to result in learning gains of the desired magnitude. Providing additional adults in the classroom who could supervise children in free choice activities (e.g., parent or community volunteers, paraprofessional aides) could free teachers to spend more time in small group interactions. Ensuring that teachers have adequate paid preparation hours would also reduce the perceived burden of planning and preparation.

Finally, ERF provides resources that are beyond the means of many preschool organizations. Our teachers received a variety of supports—monthly lesson plans, new classroom materials, in-class coaching, in-service workshops, and college courses. Sustainability and replication are important issues for any demonstration program. It would likely be difficult for a preschool program to replicate our work in its entirety without a hefty infusion of resources. However, selected aspects could be introduced in an incremental manner. Tomlinson and colleagues (Tomlinson, 2000; Tomlinson & McTighe, 2006) provide detailed suggestions for those who are interested in implementing differentiated instruction. Their overarching message is to think big, but start small. They suggest laying the groundwork with study groups or training that focuses on the big picture—the broad goals and desired outcomes of differentiated instruction. But subsequent plans for new classroom practices should focus on only one or two small changes at a time, such as trying multi-level instruction for one particular learning activity and observing how children respond. As teachers become comfortable and successful with the new steps, additional and larger changes can be added.

References

Administration for Children and Families. (2003). *Head Start FACES 2000: A whole-child perspective on program performance. Fourth progress report.* Washington, DC: US Department of Health and Human Services.

CTB/McGraw-Hill (1990). *The Developing Skills Checklist norms book and technical manual*. Monterey, CA: Author.

DeBaryshe, B. D., & Gorecki, D. M. (2007). Experimental validation of a preschool emergent literacy curriculum. *Early Education and Development, 18*, 93-110.

DeBaryshe, B. D. & Gorecki, D. (2005). Enhancing emergent literacy and math in at-risk preschoolers: A home-school partnership model. In A. Maynard and M. Martini (Eds.). *The psychology of learning in context: Cultural artifacts, families, peers and schools pp. 175-200*. New York: Kluwer/Plenum.

Dodge, D.T. (2002). *The creative curriculum for preschool*, (4th Ed). Washington, D.C.: Teaching Strategies, Inc. (Available from Teaching Strategies, Inc., Box 42243, Washington, DC 20015.)

Dunn, L. & Dunn, L. (1997). *Peabody Picture Vocabulary Test--Third Edition (PPVT-III).* AGS Publishing, Circle Pines, MN 55014-1796

FPG Child Development Institute (2005). How is the preschool day spent? *Early Developments, 9*(1), 22-27. Retrieved January 4, 2009 from http://www.fpg.unc.edu/ncedl/PDFs/ED9_1.pdf

Invernizzi, M., Sullivan, A., Meier, J. & Swank, L. (2004). Phonological Awareness Literacy Screening (PALS-PreK). Charlottesville, VA: University of Virginia.

Kaplan, D., & Walpole, S. (2005). A stage-sequential model of reading transitions: Evidence from the Early Childhood Longitudinal Study. *Journal of Educational Psychology, 97,* 551-563.

Magnuson, K. A. & Waldfogel, J. (2005) Early childhood care and education: Effects of ethnic and racial gaps in school readiness. *The Future of Children*, *15*(*1*), 169-196.

Magnuson, K. A., Meyers, M . K., Ruhm, C. J., & Waldofgel, J. (2004). Inequality in preschool education and school readiness. *American Education Research Journal, 41*, 115-157.

Molfese, V. J., Modglin, A. A., Beswick, J. L., Neamon, J. D., Berg, S. A., Berg, J., & Molnar, A. (2006). Letter knowledge, phonological processing, and print knowledge: Skill development in nonreading preschool children. *Journal of Reading Disabilities, 39,* 296-305.

Tomlinson, C. A. (2000). *Differentiation of instruction in the elementary grades*. ERIC Digest EDO-PS-00-7. Retrieved December 16, 2008 from http://www.ericdigests.org/2001-2/elementary.html

Tomlinson, C., & McTighe, J. (2006). *Integrating differentiated instruction and understanding by design: Connecting content and kids*. Alexandria, VA: Association for Supervision and Curriculum Development.

Purcell, T., & Rosemary, C. A. (2008). Differentiating instruction in the preschool classroom: Bridging emergent literacy instruction and developmentally appropriate practice. In L. M. Justice and C. Vukelich (Eds.). *Achieving excellence in preschool literacy instruction* (pp. 221-241). New York: Guilford.

Reid, D., Hresko, W. & Hammill, D., (2001). *TERA3 examiner's manual*. Austin, TX: Pro-ed.

Restrepo, M. A. & Dubusik, V. (2008). Language and literacy practices for English language learners in the preschool setting. . In L. M. Justice and C. Vukelich (Eds.). *Achieving excellence in preschool literacy instruction* (pp. 242-260). New York: Guilford.

Sophian, C. (2004). Mathematics for the future: Developing a Head Start curriculum to support mathematics learning. *Early Childhood Research Quarterly 19*, 59-81.

U.S. Department of Education, National Center for Educational Statistics (2001). *Entering kindergarten: A portrait of American children when they begin school: Findings from The Condition of Education, 2000.* NCES 2001-035. Washington, DC: U. S. Government Printing Office.

Vygostky, L. S. (1978). *Mind in society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.

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Table 1

Analysis of Variance Results for LC-COR Data

Variable	Higher-Risk	Lower-Risk	*F*	Partial η^2
Number of Literacy Activities Introduced	86.54 (29.81)	101.53 (38.62)	3.01†	.03
Number of Math Activities Introduced	78.43 (25.59)	90.65 (25.31)	4.04*	.04
Percent of Literacy Activities at Intermediate or Mastery Level	55.28 (24.00)	73.54 (22.02)	11.85***	.11
Percentage of Math Activities at Intermediate or Mastery Level	60.52 (30.51)	82.39 (14.99)	21.28****	.19

Note. Means are followed by standard deviations in parentheses.

† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0005$.

Table 2

Analysis of Variance Results for Child Test Scores

	Higher-Risk			Lower-Risk				
	Pre	Post	Gain	Pre	Post	Gain	Effects	Partial η^2
PPVT	59.48 (13.00)	74.42 (12.93)	14.94	89.97 (10.31)	94.24 (9.53)	4.27	G**** T**** GT****	.59 .36 .15
TERA	77.33 (6.28)	79.57 (9.40)	2.24	87.92 (12.58)	95.21 (14.38)	7.39	G**** T*** GT†	.20 .13 .04
Letter Names	1.76 (4.11)	7.33 (8.38)	5.77	5.35 (7.98)	12.88 (9.91)	6.93	G*** T**** GT	.06 .40 .01
PALS Alphabet	1.88 (4.22)	9.70 (11.08)	7.82	7.07 (11.47)	17.63 (15.32)	10.56	G** T**** GT	.06 .44 .02
PALS Phoneme	0.82 (1.45)	4.91 (5.48)	4.10	3.05 (4.23)	9.40 (6.64)	6.35	G**** T**** GT†	.11 .38 .03

(Table 2, cont'd.)

PALS Print	2.48 (2.36)	7.88 (4.07)	5.39	5.19 (4.32)	11.15 (3.54)	5.96	G^{****} T^{****} GT	.12 .70 .01
DSC	5.24 (4.49)	11.64 (5.75)	6.40	9.05 (7.30)	17.27 (7.88)	8.25	G^{***} T^{****} $GT^{\dagger}$	.09 .64 .03

Note. Pre and posttest means are followed by standard deviations in parentheses.

On the TERA, *n* for high-risk and peer groups = 21 and 66, respectively; for all other tests, *n* = 33 and 95.

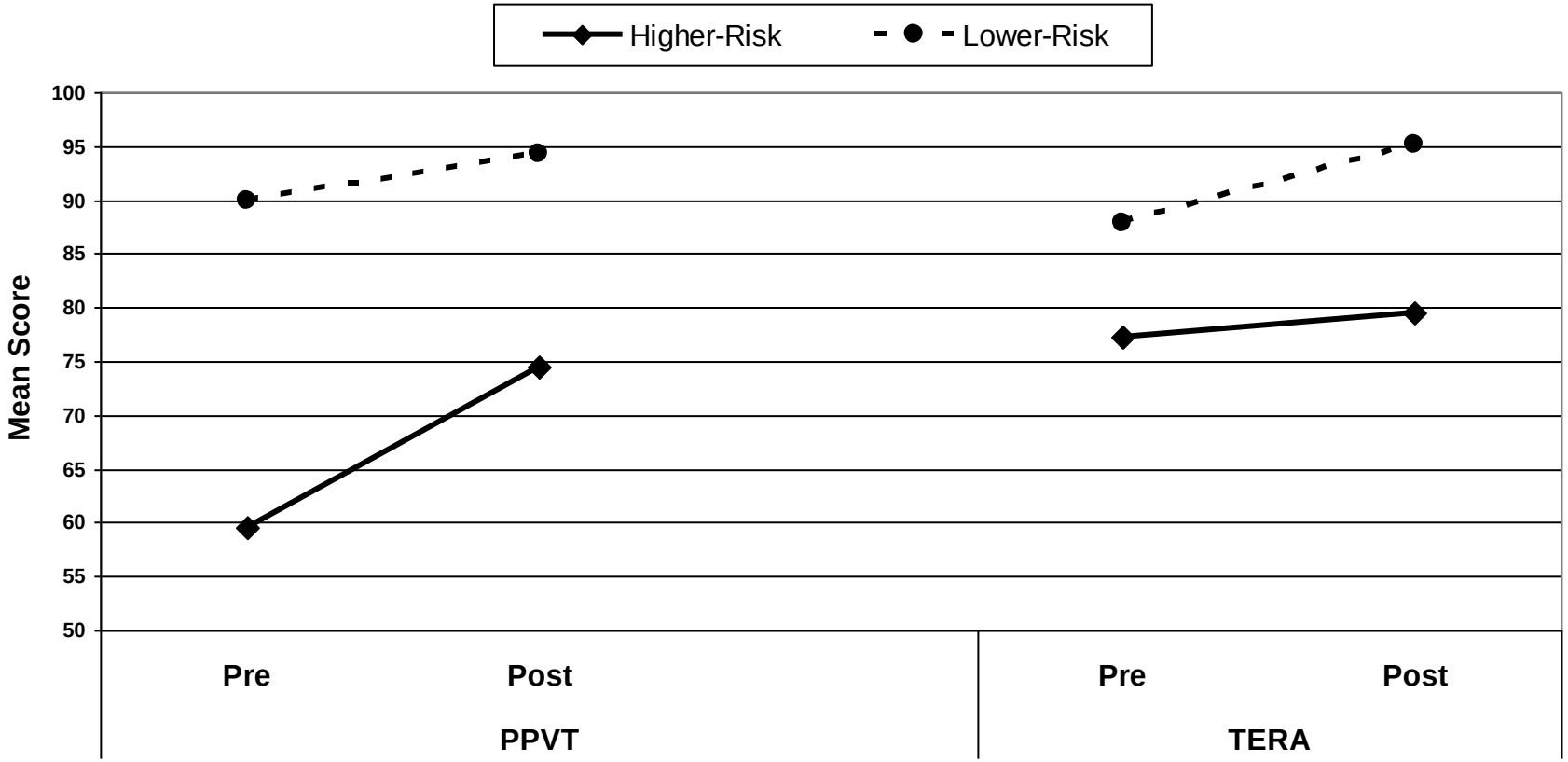
† $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$, **** $p < .0005$.

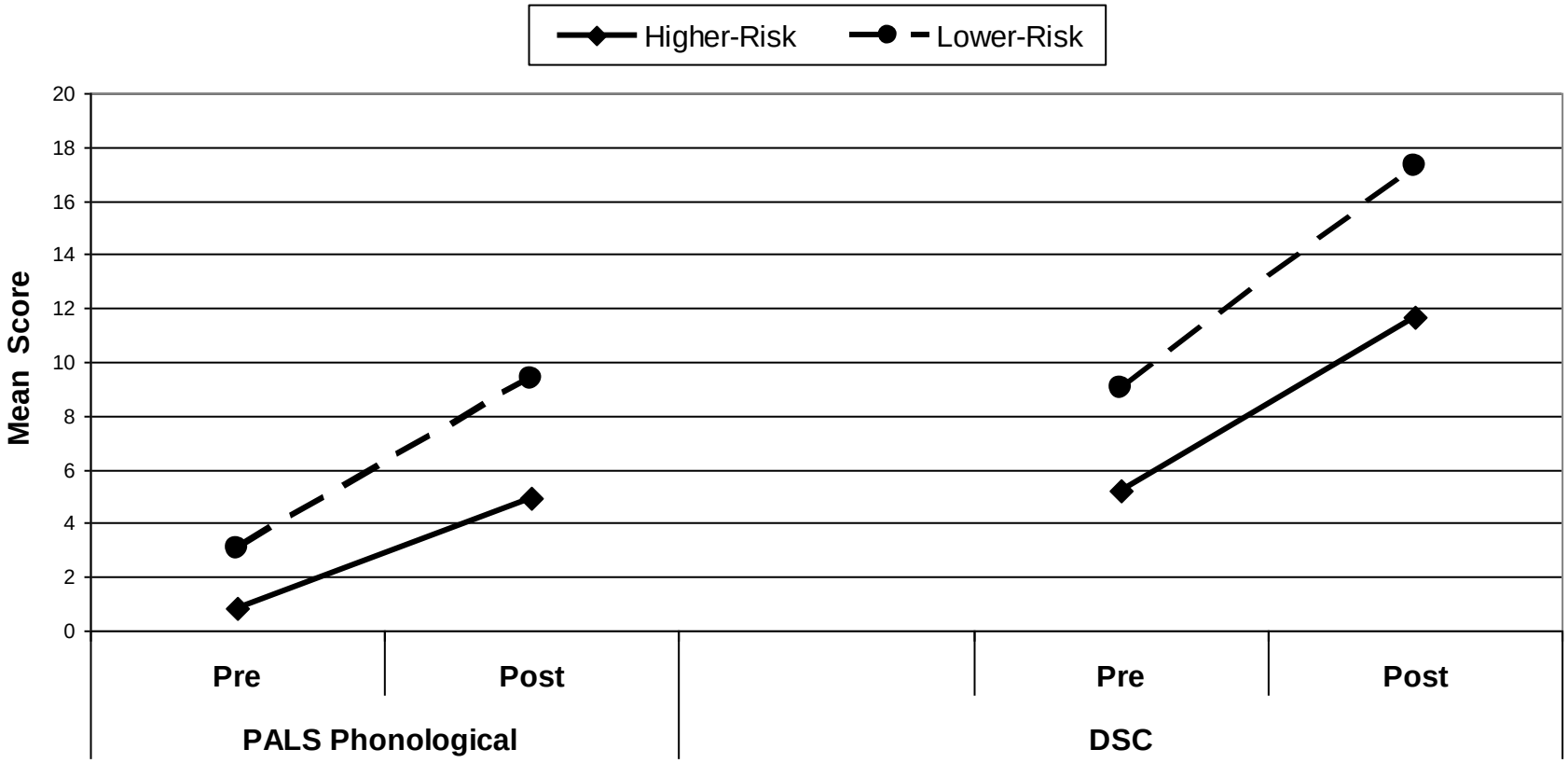
Figure Captions

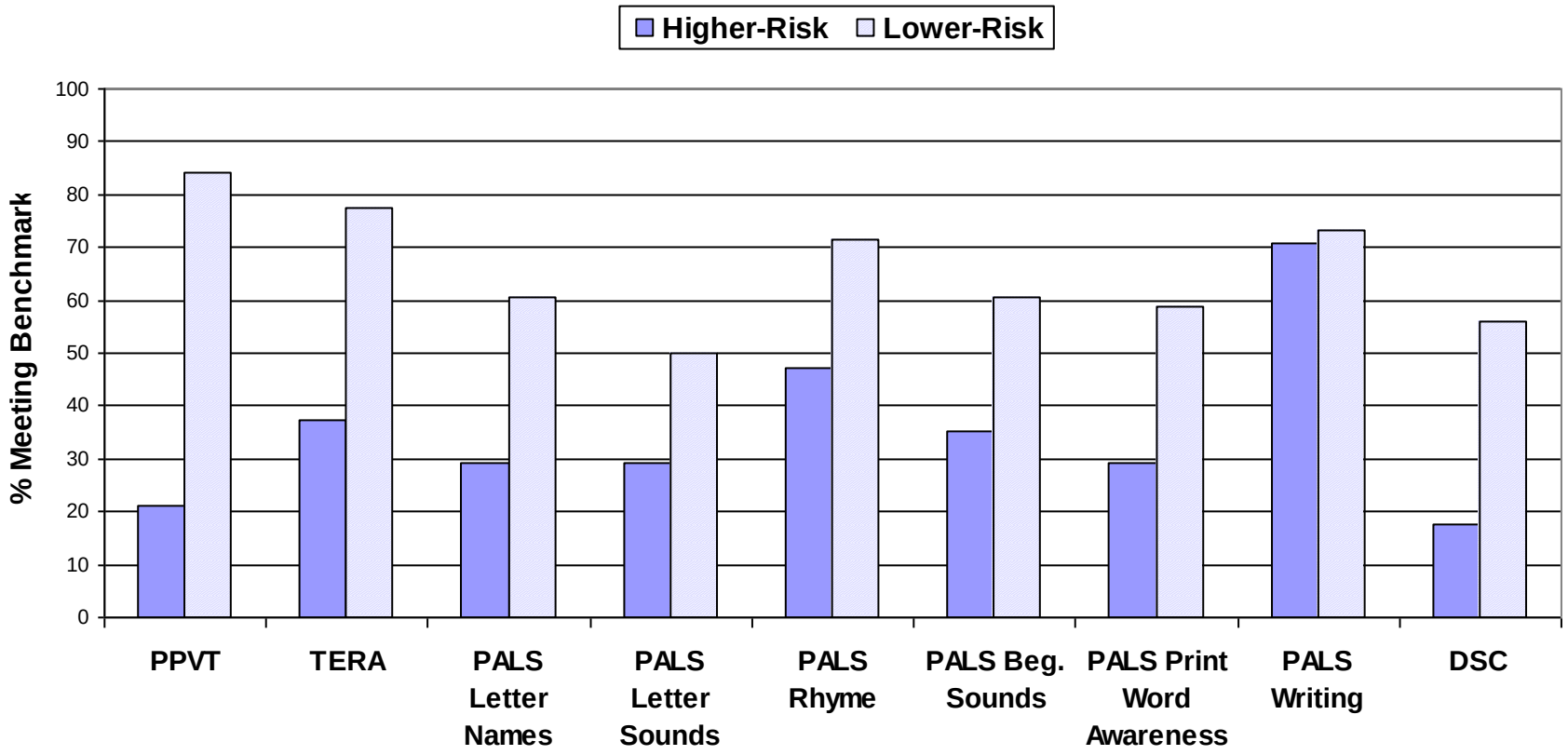
Figure 1: Pre- and posttest PPVT and TERA scores by group

Figure 2: Pre- and posttest phonological awareness and DSC scores by group

Figure 3: Percentage of children meeting spring benchmarks by group


Higher-Risk
Lower-Risk
Mean Score
100
95
90
85
80
75
70
65
60
55
50
Pre
Post
Pre
Post
PPVT
TERA


Higher-Risk
Lower-Risk
Mean Score
20
18
16
14
12
10
8
6
4
2
0
Pre
Post
Pre
Post
PALS Phonological
DSC


Higher-Risk
Lower-Risk
% Meeting Benchmark
100
90
80
70
60
50
40
30
20
10
0
PPVT
TERA
PALS Letter Names
PALS Letter Sounds
PALS Rhyme
PALS Beg. Sounds
PALS Print Word Awareness
PALS Writing
DSC