

Results for Children Receiving *Ready to Advance* Instruction in Early Childhood Education Classrooms

Introduction

During the 2018–2019 school year in Early Childhood Education (ECE) preschool classrooms in a district in California, new curriculum materials were being used. In the ECE classrooms, the new program *Ready to Advance* was being used as the core curriculum materials. Benchmark Education Company (BEC) was interested in understanding the outcomes that could be achieved using *Ready to Advance* as a core curriculum and approached the district with a request to do a study.

For the 2018–2019 school year, the original intent was to do the assessments near the beginning and end of the school year. As sometimes happens in a real-world environment, the initial assessment was delayed until January 2019 (winter). The end of year (spring) assessment was conducted as planned in May 2019. This report provides an analysis of the data gathered from the ECE classrooms during the winter and spring assessments. The ECE classroom results show the progress made from the middle of the year to the end.

Phase II of this study was going to show progress from the beginning of the next school year to the end of the school year. Unfortunately, the COVID-19 pandemic halted the follow-up study and it became impossible to complete the second phase. As a result, this study will stand as is and, based on the comparison of the results to the norms, will qualify for Level 3 ESSA Evidence.

Participants

The ECE children participating in the study attended eight schools that contain 11 preschool classrooms and 22 a.m./p.m. classes. Initially 435 children were on the rosters for ECE classrooms. Of the 289 children in ECE classrooms who were 4 years old by 9/1/2018, 14 children were opted out by parents/guardians using the permission process or by the child at the time of testing. During the winter assessment window, 233 children had valid assessments. During the spring assessment window, 215 children in the ECE classrooms had valid assessments. There were 193 children in ECE classrooms with both winter and spring assessments. This group of children was 52 percent female. The schools that these children attended were 97 percent Hispanic with 90 percent of students qualifying for free or reduced cost meals.

Assessments

The assessment instruments for this study included the following:

- PPVT-4: The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007) is a nationally normed test of receptive vocabulary that has been used in many studies with preschool-age children. It was co-normed with the Expressive Vocabulary Test, Second Edition. Technical reports of the PPVT-4 show high internal consistency reliability (0.95 to 0.97 for the 2- to 6-year-old age range) and strong test-retest reliabilities (0.91 to 0.94).
- The Other Content Assessment was comprised of additional items that represent high-value and predictive mathematics and literacy items. This is not meant to be a comprehensive assessment, but rather a short addition to the PPVT-4 that gives some additional information about children's abilities in the areas of mathematics and literacy.

Data Gathering, Analysis, and Results

During the winter assessment, six consultants were responsible for completing the assessments in a one-on-one session with children in the ECE classrooms. During the spring assessment, five of those six consultants returned and two were added for a total of seven consultants. There was an average of 4.75 consultants in the schools across the eight-day assessment window in the winter and an average of 4.07 consultants in the schools across the 14-day window for the spring assessment.

For each child assessed, the consultants completed a spreadsheet with the specific assessment information and then transmitted the spreadsheet to a secure location on a OneDrive within the BEC networks. From the OneDrive, all the spreadsheets were compiled into one spreadsheet that was used for the analysis. The consultant also collected a child assent form and the additional sheet used by children to write their names. These artifacts were mailed to a central location for processing.

PPVT-4 Assessment Analysis

For each PPVT-4 assessment, the number of errors made by the child was subtracted from the ceiling item (last item in the last set that was completed) to provide the raw score. The raw score was then converted into a standard score based on the age of the child. The standard score was used to determine the percentile rank (PR), normal curve equivalent (NCE), and stanine. The raw score was used to determine the Growth Scale Value (GSV), which is designed for measuring change over time.

ECE Results from Winter to Spring

The ECE analysis with the PPVT-4 used a paired-samples t-test to determine whether the mean difference between the winter and spring assessments of children in the ECE classrooms was

statistically significant. The data met the four assumptions of the paired-samples t-test: the dependent variable, PPVT-4 standard scores, was continuous; the independent variable was categorical, with matched pairs; there are no extreme outliers in the data set; and the differences in the dependent variable between winter and spring were normally distributed.

There were 193 children in the ECE classrooms who had both the winter and spring PPVT-4 standard scores. The paired-samples t-test showed the *Ready to Advance* instruction in the ECE classrooms elicited a statistically significant increase in the spring PPVT-4 standard scores compared to the winter PPVT-4 standard scores, $M = 6.093$, 95% CI [4.566, 7.621], $t(192) = 7.868$, $p < .001$. Additionally, the effect size¹, based on Cohen's d^2 , was $d = 0.57$, a medium effect that shows the mean score moved more than half a standard deviation from the winter to the spring assessment.

The GSV score was also analyzed for the ECE classrooms with matched scores from winter to spring. The paired-samples t-test also showed a statistically significant increase in the spring PPVT-4 GSV score compared to the winter GSV score, $M = 10.285$, 95% CI [8.640, 11.930], $t(192) = 12.332$, $p < .001$. The effect size for the GSV scores was $d = 0.89$, a large effect that shows movement of the mean of the GSV scores of almost a standard deviation from the middle of the year to the end of the year. In support of the finding with the GSV, the PPVT-4 Manual³ indicates change in the GSV score must be more than 8 points to be statistically significant or unlikely to have occurred by chance.

Using the means of the standard scores of the children in the ECE classrooms at winter and spring assessments and converting them into PR and NCE help show the growth that occurred during the second half of the 2018–2019 school year. At the winter assessment, the children in the ECE classrooms had a mean of 84.22 standard score points, equivalent to the 14th PR and the 28th NCE, putting this score into the moderately low score range. This mean score was more than one standard deviation from the mean ($M = 100$) of the normal distribution. At the spring assessment, the mean score for children in the ECE classrooms was 90.31, equivalent to the 25th PR and the 36th NCE. This mean score was within one standard deviation of the mean of the normal distribution and within the average score range.

Table 1 brings all the data together for the comparison of children with matched scores from the winter to the spring PPVT-4 assessments. The testing windows (winter and spring) are in the first column. This is followed by the average age of the group during each testing window. For the standard score, the mean, standard deviation (SD), PR, NCE, and effect size are shown. The GSV mean, SD, effect size, and age equivalents are shown. Although some feel age equivalents

¹ Effect sizes were calculated for the paired-samples t-test by dividing the mean difference by the standard deviation of the differences.

² Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

³ Dunn, L.M., & Dunn, D. M. (2007). *Peabody Picture Vocabulary Test, Fourth Edition Manual*. Bloomington, MN: PsychCorp.

do not provide an accurate measure of achievement⁴, since we are not using them for making diagnostic or placement decisions, age equivalents are included and are intended to be informational only. The age equivalents show growth of eight months over a five-month period, supporting the movement of the group.

Table 1. ECE Results from Winter to Spring – Details

Testing Windows	Average Age at Testing	Standard Score					GSV			
		Mean	SD	PR	NCE	Effect Size	Mean	SD	Effect Size	Age Equivalents
Winter Assessment	4 years, 8 months	84.22	14.215	14th	28th	0.57	108.05	15.557	0.89	3 years, 7 months
Spring Assessment	5 years, 0 months	90.31	14.007	25th	36th		118.33	15.315		4 years, 3 months

Other Content Assessment Analysis

For the winter assessment, several of the literacy activities were omitted to stay within the assessment timeframe of about 20 minutes per child. We were able to consolidate the literacy activities during the spring assessment and most children were able to focus for a longer period, allowing the completion of assessments within the time allotted. The math items and name writing were administered during both assessments.

The mathematics activities provide results that could be compared for children in the ECE classrooms. As far as counting, during the winter assessment, the ECE group counted to 11.96 on average, with 59 the highest number counted to by a member of the group. During the spring assessment, the ECE group counted to 18.70 on average, with 100 as the highest number counted to by a member of the group. For the children in the ECE classrooms (n = 200), there was improvement in counting to 8, starting at 2 from 4.50 to 14.00 percent of the ECE group. Counting backward from 6 improved from 3.52 to 16.58 percent of the ECE group (n = 199).

In name writing, the areas that were observed were: holding the pencil correctly; writing from left to right; forming recognizable letters; having all letters in the name present; and starting the name with a capital letter. Children were scored on a scale of 0 to 3, from not doing the skill at all to completely doing the skill. The children in the ECE classrooms improved in all areas from winter to spring, with an overall increase from 9.90 to 11.62 points out of a possible 15 points. The skill that improved the most from the winter to spring assessment was starting the name with a capital letter.

Children in the ECE classrooms were asked to point to a letter in a group of four letters based on the sound provided by the consultant and then asked to name the letter that was chosen.

⁴ See, for instance, <https://www.pearsonassessments.com/campaign/interpretation-problems-of-age-and-grade-equivalents.html>

The letters included the first 15 letters introduced in the *Ready to Advance* program, including m, a, t, i, n, s, c, o, f, u, p, l, h, e, and b. On average, 49.12 percent of the time children pointed to the correct letter based on the sound. Additionally, 41.30 percent of the time children correctly named the letter they selected. The most frequently correct letter selected based on sound was “m” (68.16%), and the letter most frequently named correctly was “o” (53.01%).

Summary

The importance of a high-quality early start in school has been shown to be important not just in the early elementary years, but also for years to come⁵. The importance of a strong start in school was recognized by this California district and the commitment was made to use the *Ready to Advance* curriculum in the ECE classrooms during the 2018–2019 school year. The study reported on in this report was designed to answer the questions about differences in progress made by children in the ECE classrooms.

The results from this abbreviated study show statistically significant results for children who were tested in the winter and spring on the PPVT. Standard scores (mean gain of 6.093 points) and GSV (Growth Scale Value) scores (mean gain of 10.285 points) on the PPVT were statistically significantly larger in the spring as compared to the winter scores. The growth on the PPVT moved this group of preschool children from the 14th to the 25th percentile rank, from below average into the average range. The effect sizes were medium ($d = 0.57$) on the standard scores and large ($d = 0.89$) on the GSV scores.

Kilpatrick and O’Brien⁶ suggest that in determining instructional or intervention effectiveness, it is appropriate to explore both effect sizes and standard scores rather than using just raw scores or statistical significance. In the study of *Ready to Advance*, both standard scores and growth scale values were used to show growth experienced by children in the study. The effect sizes for these two measures supported that growth. This study shows there is good reason to believe *Ready to Advance* instruction in ECE classrooms makes a positive difference. Based on these results, this study qualifies for Level 3 ESSA Evidence.

⁵ See, for instance, <https://heckmanequation.org/resource/perry-intergenerational-effects-summary/>

⁶ Kilpatrick, D. A., & O’Brien, S. (2019). Effective prevention and intervention for word-level reading difficulties. In D. A. Kilpatrick, R. M. Joshi, & R. K. Wagner (Eds.), *Reading development and difficulties: Bridging the gap between research and practice*, (pp 179–210). Cham, Switzerland: Springer Nature.