

Research Brief  
**Growth Rates in Multiple Developmental Domains for Children  
Ages 3 through 5 Based on 2012-13 Assessment Data**  
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**Overview:** One of the main goals of early childhood education and assessment is to promote growth in multiple developmental domains by providing children with developmentally appropriate learning opportunities. By conducting observational assessment using the Galileo® Pre-K Online Educational Management System, early childhood programs are provided with measures of child growth along with specific information about which capabilities the child has learned and which capabilities the child is ready to learn. Early childhood programs can use this information to track child progress along a developmental path and to guide the planning of developmentally appropriate learning opportunities. The goal of the current research is to provide early childhood programs with additional information about the amount of growth that can be expected for a given time period in various developmental domains. This information can assist programs in evaluating whether children are displaying adequate growth throughout the year in each developmental domain.

**Design:** This research evaluated child growth throughout the 2012-13 program year in more than 80 early childhood programs in 24 states nationwide. The data in this study were collected as part of the ongoing multi-method observational assessments conducted by these programs using the Galileo G3 assessment scales for 3- through 5-year olds. The current study evaluated growth for 11 assessment scales targeting various developmental domains (i.e., *Approaches to Learning, Creative Arts, Early Math, English Language Acquisition, Language, Literacy, Logic and Reasoning, Nature and Science, Physical Development and Health, Social and Emotional Development, Social Studies*) as well as a *School Readiness Scale* consisting of 88 critical school readiness capabilities drawn from the assessment scales. On average, nine observations were conducted for each child for each scale throughout the 2012-13 program year. The sample for each scale contained, on average, 126,871 observations representing 14,011 children. Future evaluation of growth for the G3 assessment scale in the domain of *Technology* is planned.

**Measures of Child Growth:** ATI uses procedures based in Item Response Theory to estimate a difficulty and discrimination parameter for each capability within each Galileo scale on a regular basis. Based on these analyses and the observational assessment data for a child for a given scale, Galileo provides an estimate of child ability (i.e., the Developmental Level [DL] score) for that developmental domain. Since DL scores within a domain are on a common scale, child growth can be measured via the change in DL score over time.

**Analysis and Results:** For the current study, a linear regression analysis was conducted for each scale to evaluate the relationship between child DL score and time (in days). Each regression analysis resulted in an estimate of the slope of the line that best described the change in DL scores over time for a given scale. The estimate of the slope can be interpreted as the change in the DL score associated with a one day increment of time (i.e., the daily growth rate). Table 1 presents the daily growth rate for each scale. Although some variability in daily growth rate was observed across scales, growth rates for most scales were similar (average = 0.40; minimum = 0.30; maximum = 0.50). The daily growth rate can easily be translated into an expected growth value for a given time period by simply multiplying the daily growth rate by the number of days in the time period. For purposes of illustration, Table 1 also provides estimates of the expected growth for a month (i.e., 30 days) and an entire program year (i.e., 270 days). Given that the DL scores for each scale have a standard deviation of approximately 50 points, the results suggest that children can be expected to grow by approximately one quarter of a

standard deviation each month, yielding approximately two standard deviations of growth by the end of an entire program year.

**TABLE 1**  
**Daily growth rates and expected growth values for Galileo® G3 assessment scales**  
**in various developmental domains**

<b>Daily Growth Rates and Expected Growth Values</b>			
<b>Galileo G3 Assessment Scale for 3 Through 5 Years</b>	<b>Daily Growth Rate</b>	<b>Expected Growth for One Month (30 Days)</b>	<b>Expected Growth for One Program Year (270 Days)</b>
<b>Approaches to Learning</b>	0.39	11.80	106.17
<b>Creative Arts</b>	0.50	14.92	134.30
<b>Early Math</b>	0.36	10.85	97.67
<b>English Language Acquisition</b>	0.30	9.08	81.72
<b>Language</b>	0.43	12.87	115.79
<b>Literacy</b>	0.40	11.87	106.79
<b>Logic and Reasoning</b>	0.37	10.97	98.77
<b>Nature and Science</b>	0.44	13.20	118.76
<b>Physical Development &amp; Health</b>	0.36	10.78	97.03
<b>Social and Emotional Development</b>	0.38	11.53	103.76
<b>Social Studies</b>	0.38	11.26	101.32
<b>Galileo School Readiness</b>	0.48	14.51	130.61

**Conclusion:** The study described in this research brief evaluated the growth displayed by a large nationwide sample of children assessed throughout the 2012-13 program year using the Galileo G3 assessment scales for children ages 3 through 5. The regression analyses conducted as part of this study established growth rates for Galileo scales in a wide variety of developmental domains. Based on this research, early childhood programs can estimate the amount of growth children ages 3 through 5 are expected to show in a given developmental domain for a given time period. These expected growth values will help programs to evaluate whether children are growing at an adequate rate throughout the year. If a specific child or group of children is not demonstrating adequate growth, the program can make adjustments to the curriculum and provide additional learning opportunities as needed to further promote growth.