

Research Brief

Growth Rates in Multiple Developmental Domains for Children Ages Birth through 3 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 age ranges and developmental domains. This information can assist programs in evaluating whether children are displaying adequate growth over time in each developmental domain.

Design: This research evaluated child growth throughout the 2012-13 program year in more than 40 early childhood programs in 16 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 scales for children ages birth to 8 months, 8 to 18 months, 18 to 24 months, and 2 to 3 years. The current study evaluated growth for six assessment scales in each age range targeting various developmental domains (i.e., *Approaches to Learning; Cognitive Development and General Knowledge; Language, Communication, Reading, and Writing; Physical Development and Health; and Social and Emotional Development*) as well as a *School Readiness Scale* for each age range consisting of a variety of critical school readiness capabilities drawn from the assessment scales. On average, 12 observations were conducted for each child for each scale throughout the 2012-13 program year. The sample for each scale contained, on average, 14,806 observations representing 1,140 children.

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 age range and developmental domain. Since DL scores within an age range and 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 in each age range. As Table 1 reveals, the daily growth rate typically increased as child age increased; however, the daily growth rates for children in a given age range were generally similar across developmental domains. 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 for the age range spanned by the scale. Given that the DL scores for each scale have a standard deviation of approximately 50 points, when the average expected growth across all developmental domains for each age range is summed, the results suggest that child DL scores can be expected to increase by approximately 102 points from birth to age three, yielding approximately two standard deviations of growth.

TABLE 1

Daily growth rates and expected growth values in terms of change in DL scores for Galileo® G3 scales in various age ranges and developmental domains

Daily Growth Rates and Expected Growth Values			
Galileo G3 Assessment Scale	Daily Growth Rate	Expected Growth for One Month (30 Days)	Expected Growth for Age Range Spanned by Scale (# of Days)
00-08 months: G3 Approaches to Learning	0.04	1.30	10.43 (for 240 days)
00-08 months: G3 Cognitive Development and General Knowledge	0.07	2.02	16.19 (for 240 days)
00-08 months: G3 Language, Communication, Reading, & Writing	0.06	1.67	13.35 (for 240 days)
00-08 months: G3 Physical Development and Health	0.02	0.73	5.81 (for 240 days)
00-08 months: G3 Social and Emotional Development	0.06	1.78	14.20 (for 240 days)
00-08 months: Galileo School Readiness	0.07	1.96	15.66 (for 240 days)
08-18 months: G3 Approaches to Learning	0.07	2.03	20.33 (for 300 days)
08-18 months: G3 Cognitive Development and General Knowledge	0.09	2.83	28.34 (for 300 days)
08-18 months: G3 Language, Communication, Reading & Writing	0.08	2.48	24.79 (for 300 days)
08-18 months: G3 Physical Development and Health	0.05	1.40	14.00 (for 300 days)
08-18 months: G3 Social and Emotional Development	0.08	2.52	25.18 (for 300 days)
08-18 months: Galileo School Readiness	0.08	2.31	23.11 (for 300 days)

TABLE 1 – Continued

Daily growth rates and expected growth values in terms of change in DL scores for Galileo® G3 scales in various age ranges and developmental domains

Daily Growth Rates and Expected Growth Values			
Galileo G3 Assessment Scale	Daily Growth Rate	Expected Growth for One Month (30 Days)	Expected Growth for Age Range Spanned by Scale (# of Days)
18-24 months: G3 Approaches to Learning	0.07	2.06	12.37 (for 180 days)
18-24 months: G3 Cognitive Development and General Knowledge	0.10	3.03	18.21 (for 180 days)
18-24 months: G3 Language, Communication, Reading and Writing	0.09	2.79	16.74 (for 180 days)
18-24 months: G3 Physical Development and Health	0.08	2.54	15.22 (for 180 days)
18-24 months: G3 Social and Emotional Development	0.10	3.00	18.03 (for 180 days)
18-24 months: Galileo School Readiness	0.04	1.21	7.25 (for 180 days)
2-3 years: G3 Approaches to Learning	0.14	4.13	49.54 (for 360 days)
2-3 years: G3 Cognitive Development and General Knowledge	0.14	4.15	49.77 (for 360 days)
2-3 years: G3 Language, Communication, Reading & Writing	0.16	4.74	56.85 (for 360 days)
2-3 years: G3 Physical Development and Health	0.17	4.99	59.93 (for 360 days)
2-3 years: G3 Social and Emotional Development	0.13	3.79	45.52 (for 360 days)
2-3 years: Galileo School Readiness	0.15	4.38	52.62 (for 360 days)

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 scales for children ages birth to 8 months, 8 to 18 months, 18 to 24 months, and 2 to 3 years. The regression analyses conducted as part of this study established growth rates for Galileo scales in each age range for a wide variety of developmental domains. Based on this research, early childhood programs can estimate the amount of growth children ages birth through 3 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. 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.

