

Research Brief
**Estimated Growth for Children Birth through 5 Years
Based on 2015-16 Assessment Data**

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Overview: The Galileo® Pre-K Online Educational Management System applies procedures based in Item Response Theory to information gained through observational assessment to estimate a measure of child learning called the Developmental Level (DL) score. The DL score indicates a child's position on a developmental path and provides specific information about which capabilities the child has learned and which capabilities the child is ready to learn. The change in the DL score over time can also be used to evaluate child growth. ATI conducts annual research that can be used to estimate child growth for various time periods. Conducting this research on a regular basis ensures that these predictions are sensitive to changes in child populations, curricula, and learning standards. Early childhood providers can use the information provided by this research to evaluate whether children are demonstrating adequate growth over time.

Design and Sample: The current study evaluated child DL scores throughout the 2015-16 program year. The data in this study were collected as part of the ongoing multi-method observational assessments conducted by early childhood programs using the Galileo G3 scales for children ages 0 to 8 months, 8 to 18 months, 18 to 24 months, 2 to 3 years, and 3 through 5 years (used for children up to 6 years old). For the scales for children 0 months to 3 years, child DL scores were evaluated for five 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. Observations were conducted in 35 early childhood programs in 17 states nationwide. On average, six observations were conducted for each child for each scale throughout the 2015-16 program year. The sample for each scale contained, on average, 5,260 observations representing 858 children. For the scales for children 3 through 5 years, child DL scores were evaluated for 12 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, Technology*) as well as a *School Readiness Scale* consisting of 88 critical school readiness capabilities drawn from the assessment scales. Observations were conducted in 88 early childhood programs in 27 states nationwide. On average, eight observations were conducted for each child for each scale throughout the 2015-16 program year. The sample for each scale contained, on average, 238,249 observations representing 27,900 children.

Estimated Growth for Various Time Periods: Linear regression analyses were conducted for each scale to evaluate the relationship between child DL score and time (in calendar days). Each analysis resulted in a regression equation that best describes, for a given scale, the change in DL score over time. The regression equation provides an estimate of the increase in the DL score associated with a one day increase in time (i.e., the daily growth rate). Multiplying the daily growth rate by the number of calendar days in a given time period yields an estimated growth value for that time period. Tables 1-5 present the daily growth rate for each scale in each age range along with estimates of the typical growth for a month (i.e., 30 days) and for longer periods such as the age range spanned by the scale or an entire year. As would be expected, daily growth rates were positive, indicating that child DL scores increase over time. Within an age range, the daily growth rate was similar across developmental domains. Across age ranges, the daily growth rate was higher for children assessed using the scales for 3-5 years than for children assessed using the scales for 0-3 years.

TABLE 1

Estimated growth for various time periods for Galileo® G3 assessment scales for 0-8 months

Estimated Growth for Time Period: Galileo G3 Scales for 0-8 Months			
Developmental Domain	Estimated Increase in DL Score		
	Daily Growth Rate (1 Day)	1 Month (30 Days)	8 Months (240 Days)
Approaches to Learning	0.11	3.30	26.40
Cognitive Development and General Knowledge	0.09	2.70	21.60
Language, Communication, Reading, & Writing	0.10	3.00	24.00
Physical Development and Health	0.10	3.00	24.00
Social and Emotional Development	0.09	2.70	21.60
Galileo School Readiness	0.07	2.10	16.80

TABLE 2

Estimated growth for various time periods for Galileo G3 assessment scales for 8-18 months

Estimated Growth for Time Period: Galileo G3 Scales for 8-18 Months			
Developmental Domain	Estimated Increase in DL Score		
	Daily Growth Rate (1 Day)	1 Month (30 Days)	10 Months (300 Days)
Approaches to Learning	0.10	3.00	30.00
Cognitive Development and General Knowledge	0.16	4.80	48.00
Language, Communication, Reading, & Writing	0.13	3.90	39.00
Physical Development and Health	0.13	3.90	39.00
Social and Emotional Development	0.16	4.80	48.00
Galileo School Readiness	0.08	2.40	24.00

TABLE 3

Estimated growth for various time periods for Galileo® G3 assessment scales for 8-18 months

Estimated Growth for Time Period: Galileo G3 Scales for 18-24 Months			
Developmental Domain	Estimated Increase in DL Score		
	Daily Growth Rate (1 Day)	1 Month (30 Days)	6 Months (180 Days)
Approaches to Learning	0.07	2.10	12.60
Cognitive Development and General Knowledge	0.09	2.70	16.20
Language, Communication, Reading, & Writing	0.09	2.70	16.20
Physical Development and Health	0.09	2.70	16.20
Social and Emotional Development	0.10	3.00	18.00
Galileo School Readiness	0.03	0.90	5.40

TABLE 4

Estimated growth for various time periods for Galileo G3 assessment scales for 2-3 years

Estimated Growth for Time Period: Galileo G3 Scales for 2-3 Years			
Developmental Domain	Estimated Increase in DL Score		
	Daily Growth Rate (1 Day)	1 Month (30 Days)	12 Months (360 Days)
Approaches to Learning	0.12	3.60	43.20
Cognitive Development and General Knowledge	0.15	4.50	54.00
Language, Communication, Reading, & Writing	0.17	5.10	61.20
Physical Development and Health	0.15	4.50	54.00
Social and Emotional Development	0.15	4.50	54.00
Galileo School Readiness	0.10	3.00	36.00

TABLE 5
Estimated growth for various time periods for Galileo® G3 assessment scales for 3 through 5 years

Estimated Growth for Time Period: Galileo G3 Scales for 3 through 5 Years*			
Developmental Domain	Estimated Increase in DL Score		
	Daily Growth Rate (1 Day)	1 Month (30 Days)	12 Months (360 Days)
Approaches to Learning	0.37	11.10	133.20
Creative Arts	0.47	14.10	169.20
Early Math	0.37	11.10	133.20
English Language Acquisition	0.30	9.00	108.00
Language	0.42	12.60	151.20
Literacy	0.38	11.40	136.80
Logic and Reasoning	0.34	10.20	122.40
Nature and Science	0.41	12.30	147.60
Physical Development & Health	0.31	9.30	111.60
Social and Emotional Development	0.35	10.50	126.00
Social Studies	0.35	10.50	126.00
Technology	0.37	11.10	133.20
Galileo School Readiness	0.35	10.50	126.00

**Note: The G3 scales for 3 through 5 years can be used for children up to 6 years old.*

Conclusion: The study described in this research brief evaluated DL scores for a large nationwide sample of children assessed throughout the 2015-16 program year using the Galileo G3 scales for children ages 0 to 8 months, 8 to 18 months, 18 to 24 months, 2 to 3 years, and 3 through 5 years. The regression analyses conducted as part of this study established estimates of typical growth for various time periods for Galileo scales in a wide variety of developmental domains. Early childhood providers can use the information provided by this study to evaluate whether a child is showing adequate growth over time. Providers can then make adjustments to the curriculum and provide additional learning opportunities as needed to further promote child growth.