



Using DRC BEACON to Predict Georgia Milestones Performance



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PURPOSE

The purpose of this document is to provide teachers, administrators, and other DRC BEACON (BEACON) assessment users with information about how to use the Georgia Milestones predictive information that is provided on BEACON reports. The BEACON to Georgia Milestones predictions have several potential uses. These uses are discussed, and evidence of the validity of those uses is provided. Detailed BEACON to Georgia Milestones prediction tables showing the BEACON to Milestones score and performance-level correspondence are also provided.

DRC BEACON ASSESSMENTS

BEACON is an interim (periodic) assessment that was developed by Data Recognition Corporation (DRC) to measure student performance in English Language Arts (ELA) and Mathematics in grades 3–8. The assessment is delivered on the DRC INSIGHT engine in a computer-adaptive testing (CAT) mode. Adaptive test administrations allow students and teachers a precise view of student performance afforded by the CAT process of continually adjusting item difficulty to an individual student’s ability level throughout each test administration.

BEACON assessments can be administered up to three times a year (Fall, Winter, and Spring), allowing teachers and students the ongoing opportunity to identify individual and group learning needs, and to monitor student progress toward learning expectations.

BEACON assessment results are delivered through a dynamic interactive reporting system that allows users the opportunity for immediate individual results, roster reports, and links to college- and career-ready standards. The interactive reporting system also offers the opportunity to disaggregate, categorize, and sort data to create various useful summaries of test results.

USING DRC BEACON IN SUPPORT OF EVIDENCE-BASED TEACHING AND LEARNING

The BEACON assessments are intended to provide periodic feedback on student learning at times when students are most receptive to information about their progress and learning needs. That is, BEACON offers the opportunity to collect information about student learning while there is still sufficient time remaining in the school year to take action on improvement goals.

Specifically, BEACON provides indications of: a) mastery through detailed descriptions of student performance, b) growth targets, progress, and adequacy related to improvement needs at individual and aggregate levels, and c) learning progressions that help teachers differentiate instruction by identifying what students are ready to learn next and where to focus efforts for maximum impact as they progress throughout the year.

BEACON also provides predictions of student performance on the Georgia Milestones summative assessments in ELA and Mathematics in grades 3–8 for each of the Fall, Winter, and Spring administrations. These predictions provide appropriate context for teachers to understand where students are in their learning relative to end-of-year expectations.

Since BEACON is administered three times per year, teachers are afforded these insights about student learning on a continual basis. These insights directly support processes such as: a) setting instructional priorities that are sensitive to evidence-based student learning needs, b) seeking more targeted interventions for students who require them, and c) establishing early warning indicators for students who may be at risk of not achieving grade-level proficiencies by the end of the school year. Students are afforded insights into their progress toward targeted achievement levels, and information about where they might focus their learning strategies to reach end-of-year goals.

Providing information about students' expected Milestones performance at multiple points during the school year to support teachers and students in these ways is the fundamental purpose of the BEACON to Milestones predictions.

INTERPRETING THE BEACON TO MILESTONES PREDICTIONS

The predictive relationship between BEACON and Milestones scores is particularly useful as it relates BEACON performance to expectations about how students will perform on the Georgia Milestones assessments. Each Milestones performance level has a corresponding scale score range and description that teachers and students can use to understand the knowledge and skills that are required of students to meet the expectations embodied in each level as they progress in their learning, and there is a BEACON scale score range that corresponds to those expectations for each subject, grade, and BEACON administration (Fall, Winter, Spring).

This information is noted for Math and ELA in Tables 1 and 2 respectively, noting that a student's prediction of performance on the Georgia Milestones assessment is best used within each administration window, as the inferences drawn over time are likely to change based on a combination of student learning and the data used as a basis for predictions in each window.

Table 1. Milestones performance-level scale score ranges, Math grades 3–8

Math		Beginning Learner	Developing Learner	Proficient Learner	Distinguished Learner
Third Grade	Milestones Perf Level SS Range	290-474	475-524	525-574	575-705
	Fall BEACON Scale Score	160-296	297-357	358-395	396-800
	Winter BEACON Scale Score	160-315	316-375	376-422	423-800
	Spring BEACON Scale Score	160-347	348-388	389-445	446-800
Fourth Grade	Milestones Perf Level SS Range	270-474	475-524	525-576	577-715
	Fall BEACON Scale Score	180-328	329-380	381-434	435-820
	Winter BEACON Scale Score	180-351	352-397	398-458	459-820
	Spring BEACON Scale Score	180-355	356-418	419-476	477-820
Fifth Grade	Milestones Perf Level SS Range	265-474	475-524	525-577	578-725
	Fall BEACON Scale Score	200-384	385-432	433-573	574-840
	Winter BEACON Scale Score	200-389	390-452	453-520	521-840
	Spring BEACON Scale Score	200-409	410-473	474-541	542-840
Sixth Grade	Milestones Perf Level SS Range	285-474	475-524	525-577	578-700
	Fall BEACON Scale Score	220-395	396-483	484-562	563-860
	Winter BEACON Scale Score	220-409	410-493	494-591	592-860
	Spring BEACON Scale Score	220-422	423-519	520-635	636-860
Seventh Grade	Milestones Perf Level SS Range	265-474	475-524	525-589	590-740
	Fall BEACON Scale Score	240-411	412-495	496-627	628-880
	Winter BEACON Scale Score	240-423	424-522	523-651	652-880
	Spring BEACON Scale Score	240-419	420-531	532-691	692-880
Eighth Grade	Milestones Perf Level SS Range	275-474	475-524	525-570	571-755
	Fall BEACON Scale Score	260-353	354-489	490-580	581-900
	Winter BEACON Scale Score	260-407	408-511	512-651	652-900
	Spring BEACON Scale Score	260-429	430-547	548-656	657-900

Table 2. Milestones performance-level scale score ranges, ELA grades 3–8

ELA		Beginning Learner	Developing Learner	Proficient Learner	Distinguished Learner
Third Grade	Milestones Perf Level SS Range	180-474	475-524	525-580	581-830
	Fall BEACON Scale Score	160-371	372-394	395-449	450-800
	Winter BEACON Scale Score	160-377	378-419	420-480	481-800
	Spring BEACON Scale Score	160-384	385-429	430-504	505-800
Fourth Grade	Milestones Perf Level SS Range	210-474	475-524	525-573	574-775
	Fall BEACON Scale Score	180-386	387-443	444-521	522-820
	Winter BEACON Scale Score	180-397	398-458	459-551	552-820
	Spring BEACON Scale Score	180-401	402-464	465-529	530-820
Fifth Grade	Milestones Perf Level SS Range	210-474	475-524	525-586	587-760
	Fall BEACON Scale Score	200-384	385-441	442-597	598-840
	Winter BEACON Scale Score	200-397	398-465	466-586	587-840
	Spring BEACON Scale Score	200-394	495-476	477-593	594-840
Sixth Grade	Milestones Perf Level SS Range	140-474	475-524	525-598	599-820
	Fall BEACON Scale Score	220-420	421-471	472-634	635-860
	Winter BEACON Scale Score	220-433	434-495	496-659	660-860
	Spring BEACON Scale Score	220-434	435-505	506-631	632-860
Seventh Grade	Milestones Perf Level SS Range	165-474	475-524	525-591	592-785
	Fall BEACON Scale Score	240-415	416-514	515-699	700-880
	Winter BEACON Scale Score	240-436	437-523	524-735	736-880
	Spring BEACON Scale Score	240-443	444-544	545-725	726-880
Eighth Grade	Milestones Perf Level SS Range	225-474	475-524	525-580	581-730
	Fall BEACON Scale Score	260-417	418-514	515-698	699-900
	Winter BEACON Scale Score	260-417	418-539	540-721	722-900
	Spring BEACON Scale Score	260-426	427-542	543-697	698-900

As an example how to use the BEACON to Milestones predictions, consider a third-grade student who scores 310 on the BEACON Math assessment in the Fall. The Milestones Math score prediction for this student is in the middle of the “Developing Learner” range on the Milestones assessment. This prediction, along with the information about a student’s relative strengths and potential misunderstandings that is provided on the BEACON reports, gives the teacher and the student information that can be used to focus instruction in a way that builds on the student’s strengths and addresses their misunderstandings.

This prediction can also serve as a signal that a student may need additional interventions, or efforts to accelerate their learning. In this particular example, the predictive information indicates that the student is not expected to reach the “Proficient Learner” level, so may require some acceleration in their progress toward proficiency. This prediction, combined with the information about a student’s relative strengths that is provided on BEACON report’s can further assist teachers in focusing instruction and other interventions and supports.

BEACON TO MILESTONES PREDICTIVE VALIDITY

The Standards for Educational and Psychological Testing (Standards, AERA, APA, and NCME, 2014) define validity as

“...the degree to which evidence and theory support the interpretations of test scores entailed by the proposed uses of a test.”

In the preceding discussions, the intended uses and interpretations of BEACON test results, and their predictions of performance on the Milestones assessments, are defined and discussed. However, according to the Standards, it is not enough to simply define test score uses. Scores must also be evaluated through an ongoing collection of evidence supporting score validity for their intended uses.

The BEACON Technical Report (DRC, 2020), provides the collection of validity evidence that has been gathered in support of the use of the BEACON assessments, and the body of validity evidence can be summarized as follows:

- **Content:** BEACON assessment content is aligned with state standards and the BEACON blueprints, developed and reviewed through rigorous processes, and is accessible to students through adherence to universal design principles, and assigned accommodations.
- **Relationship with other Variables:** BEACON scores show a strong relationship the state summative assessment, Georgia Milestones, indicating that assessments measure similar things in a reliable manner.
- **Response Processes:** Student responses to the BEACON items follow expected patterns.
- **Internal Structure:** BEACON has strong score reliability, score scale properties, and adaptivity in terms of student experience and score accuracy.
- **Consequences:** BEACON items have been subject to rigorous bias, fairness, and sensitivity reviews.

However, the BEACON to Milestones predictions require additional evidence to support their uses as described. The following provides a brief overview of the methods used to create the BEACON to Milestones predictions, and to collect evidence of the validity of those predictions.

DATA

Data for the linking study were gathered from four administrations: 1) BEACON Fall 2023 (August–November, 2) BEACON Winter 2023/24 (December–February, 3) BEACON Spring 2024 (March–May, and 4) Georgia Milestones Spring 2024. Student data from each BEACON administration was matched with Milestones data at the student level. The matched data were then re-sampled, using propensity score matching to weight the original samples to be state representative in terms of achievement, gender, ethnicity, disability status, locale, and Regional Education Service Agencies before the linking analysis.

METHOD

BEACON uses a statistical method called “Isotonic regression” (Barlow, Bartholomew, Bremner, & Brunk, 1972) to create the Milestones performance predictions. Isotonic regression is sometimes referred to as monotonic regression, which is a technique of fitting a free-form line to a sequence of observations such that the fitted line is non-decreasing (or non-increasing) everywhere, and lies as close to the observations as possible. Isotonic regression was chosen among several alternative linking methods as the most appropriate linking method to link BEACON and Georgia Milestones performance. Separate regression lines were developed for each BEACON administration: Fall, Winter, and Spring.

PREDICTIVE VALIDITY EVIDENCE

As discussed, the intended use of predictions requires an evaluation of the predictive validity of BEACON scores. An effective approach to collecting this type of evidence is to simply compare students’ actual Milestones scores to the scores they were predicted to achieve throughout the school year. Fortunately, this information is readily available in the context of test score predictions.

The predicted Milestones scale scores and performance levels were compared with Georgia Milestones scale scores and performance levels. The correlations and the classification consistency coefficients between predicted scale scores and actual Milestones scale scores were generated across all subjects, grades, and administrations, and show strong correlations and high classification consistency, demonstrating prediction accuracies.

References

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education. (2014). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

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