DRC BEACON

ASSESSMENT

Using DRC BEACON to Predict Georgia Milestones Achievement

DATA RECOGNITION
DRC
CORPORATION

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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 Georgia Milestones score and achievement 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 configured a variety of ways, including comprehensive ELA and mathematics tests or in smaller testlets that focus on specific domains of content. We recommend that the full ELA and mathematics tests be administered 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 achievement on the Georgia Milestones summative assessments in ELA and mathematics in grades 3–8 for each of the Fall, Winter, and Spring administrations. Rather than indicating how the students would perform on Georgia Milestones at that moment in time, the predictions account for typical growth to be expected at the end of the school year. These predictions provide appropriate context for teachers to understand where students are in their learning *relative* to end-of-year expectations.

During the 2023/2024 school year, new academic content standards in mathematics will be applied in Georgia classrooms and to the Georgia Milestones assessments, meaning data will not be available for computing mathematics predictions until the summer of 2024, for use in the 2024/2025 school year. Therefore, only ELA predictions are available during the 2023/2024 school year.

Since BEACON is typically 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 Georgia Milestones achievement at multiple points during the school year to support teachers and students in these ways is the fundamental purpose of the BEACON to Georgia Milestones predictions.

INTERPRETING THE BEACON TO MILESTONES PREDICTIONS

The predictive relationship between BEACON and Georgia Milestones scores is particularly useful as it relates BEACON performance to expectations about how students will perform on the Georgia Milestones assessments. Each Georgia Milestones achievement 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 ELA in Table 1, noting that a student's prediction of achievement 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. Georgia Milestones (GM) achievement level scale score ranges, ELA grades 3–8

ELA		Beginning Learner	Developing Learner	Proficient Learner	Distinguished Learner
Third Grade	**GM Scale Score Ranges**	290–474	475–524	525–579	580–705
	Fall BEACON Scale Score	160–346	347–390	391–479	480–800
	Winter BEACON Scale Score	160–365	366–415	416–498	499–800
	Spring BEACON Scale Score	160–371	372–413	414–508	509–800
Fourth Grade	**GM Scale Score Ranges**	270–474	475–524	525–584	585–715
	Fall BEACON Scale Score	180–371	372–446	447–571	572–820
	Winter BEACON Scale Score	180–400	401–452	453–586	587–820
	Spring BEACON Scale Score	180–384	385–468	469–654	655–820
Fifth Grade	**GM Scale Score Ranges**	265–474	475–524	525–579	580–725
	Fall BEACON Scale Score	200–383	384–463	464–593	594–840
	Winter BEACON Scale Score	200–401	402–476	477–597	598–840
	Spring BEACON Scale Score	200–403	404–470	471–642	643–840
Sixth Grade	**GM Scale Score Ranges**	285–474	475–524	525–579	580–700
	Fall BEACON Scale Score	220–406	407–470	471–576	577–860
	Winter BEACON Scale Score	220–410	411–508	509–607	608–860
	Spring BEACON Scale Score	220–428	429–492	493–593	594–860
Seventh Grade	**GM Scale Score Ranges**	265–474	475–524	525–579	580–740
	Fall BEACON Scale Score	240–419	420–510	511–664	665–880
	Winter BEACON Scale Score	240–428	429–532	533–679	680–880
	Spring BEACON Scale Score	240–430	431–557	558–638	639–880
Eighth Grade	**GM Scale Score Ranges**	275–474	475–524	525–578	579–755
	Fall BEACON Scale Score	260–395	396–514	515–668	669–900
	Winter BEACON Scale Score	260–440	441–530	531–730	731–900
	Spring BEACON Scale Score	260–423	424–636	637–842	843–900

To use the BEACON to Georgia Milestones predictions, consider a third-grade student who scores 370 on the BEACON ELA assessment in the Fall. The Georgia Milestones ELA score prediction for this student is in the middle of the "Developing Learner" range on the Georgia 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 students' 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 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 reports, 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 Georgia 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 Georgia 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 Georgia 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 2022 (August–November), 2) BEACON Winter 2022 (December–February), 3) BEACON Spring 2023 (March–May), and 4) Georgia Milestones Spring 2023. Student data from each BEACON administration were matched with Georgia Milestones data at the student level. The matched data were then resampled, using propensity score matching to weight the original samples to be state representative in terms of achievement, gender, ethnicity, disability status, and local and Regional Education Service Agencies before the linking analysis.

METHOD

Linking BEACON to Georgia Milestones uses a statistical method called "Isotonic regression" (Barlow, Bartholomew, Bremner, & Brunk, 1972) to create the Georgia Milestones achievement 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 achievement. Separate regression lines were developed for each BEACON administration—Fall, Winter, and Spring—so outcomes from each administration account for expected progress for the remainder of the school year.

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 Georgia Milestones scores to the scores they were predicted to achieve throughout the school year. Fortunately, this information is readily available.

The predicted Georgia Milestones scale scores and achievement levels were compared with observed Georgia Milestones scale scores and achievement levels. The correlations and the classification consistency coefficients between predicted scale scores and actual Georgia Milestones scale scores were generated across all subjects, grades, and administrations, and show strong correlations (ranging from 0.84 to 0.92) and high rates of classification consistency (kappas ranging from 0.38 to 0.63), demonstrating prediction accuracies.

Moving forward, the BEACON to Georgia Milestones predictions will be updated annually. The prediction information provided in Table 1 is based on the 2022/2023 school year data and is used for the reported predictions in 2023/2024.

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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