

DYNAMIC MEASUREMENT GROUP

DIBELS Next® Technical Adequacy Brief

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Technical Adequacy Information Update for *DIBELS Next*®

Since the publication of *DIBELS Next*® in 2010 and the publication of the *DIBELS Next Technical Manual* (Good, et al., 2013), a number of new studies have been conducted examining the technical adequacy of DIBELS Next. The results of these studies have been published in various forms (websites, papers, etc.) and have not yet been integrated into the *DIBELS Next Technical Manual*. Until these data can be integrated, this document will provide a quick reference to the most up-to-date information on the technical adequacy (e.g., reliability and validity) of *DIBELS Next*.

What's new?

Alternate-Form Reliability. Updated alternate-form reliability is available for First Sound Fluency (FSF), Phoneme Segmentation Fluency (PSF), Nonsense Word Fluency Correct Letter Sounds (NWF CLS) and Whole Words Read (NWF WWR), and Daze. These new estimates are reported in place of the previous estimates in a summary table that includes all reliability information for *DIBELS Next*.

Reliability of the Slope. New estimates for the reliability of the individual growth rate (slope) is available for all *DIBELS Next* measures in all grades.

Descriptions of the Samples

Technical adequacy information for *DIBELS Next* was calculated from sets of data from the *DIBELSnet*® and the *mCLASS*® data reporting services. The data were collected and entered by school personnel. Every census region in the United States was represented. There are five primary samples.

Sample 1. Progress monitoring data from the school year 2011-2012 were exported from the *mCLASS* data reporting service. There were approximately 3,000 students in third through sixth grade. The sample was approximately 61% White, 15% African American, and 13% Hispanic.

Sample 2. Progress monitoring and benchmark data from the 2013-2014 school year were exported from the mCLASS data reporting service. There were approximately 21,157 students in kindergarten and first grade from 2,196 schools within 634 districts. The sample was approximately 45% White, 20% African American, and 27% Hispanic.

Sample 3. Progress monitoring data from the school year 2013-2014 were exported from the *DIBELSnet* data reporting service. There were approximately 130,000 students in first through sixth grades from 1,121 schools within 388 school districts. Demographic information for this sample is not available.

Sample 4. Benchmark administration, validity, and reliability data were collected during the 2009-2010 school year. There were approximately 3,816 students in kindergarten through sixth grade from thirteen schools within five school districts. Demographic information for this sample is not available. For more information on this sample, please refer to the *DIBELS Next Benchmark Goals Study* (Powell-Smith, et al., 2012) available for download from <http://DIBELS.org/pubs.htm>.

Sample 5. Benchmark administration data from the 2012-2013 school year were exported from mCLASS data reporting service. There were approximately 1,151,329 students from kindergarten through third-grade. The sample was approximately 25% white, 17% Black, 21% Hispanic, and 32% unknown.

Analyses

All data were evaluated for validity, and invalid scores were removed. Invalid scores were classified as scores that are not possible, such as exceeding the maximum possible score, or pairs of invalid scores such as *DIBELS* Oral Reading Fluency Words Correct per minute (DORF WC/Min) and DORF Errors scores that add up to a sum that exceeds the maximum possible. For the reliability of the slope analysis, the student-level RMSE was evaluated as an indicator of invalid data. For example, the RMSE could be artificially inflated due to additional variability that is not explained by the student's scores such as environmental concerns (e.g., inadequate or uncomfortable facilities) or errors in data entry. Thus, students were included in the analysis

if their RMSE was below 13 for FSF, 10 for PSF, 13 for NWF CLS, and 6 for NWF WWR. For DORF, students in first and second grades whose RMSE was less than 11 and students in third, fourth, fifth, and sixth grades whose RMSE was less than 10 were included in the analysis. Further, progress monitoring records that contained zero scores were removed for several reasons: 1) for DORF, the possibility that a student read zero words (including the connector words like "of", "and", and "the") is extremely unlikely, and it is more likely that the student did not attempt the task, and the assessor recorded a zero instead of a missing value; 2) a score of zero may indicate that the student did not understand the task and thus did not attempt it; and 3) a score of zero would likely be a leverage point and could alter the slope dramatically, thereby compromising the results of the analysis. Additionally, some students recorded multiple zeroes in combination with very low scores, in which case, progress monitoring on below-grade-level materials is recommended.

Reliability of the Slope of Improvement

The reliability of the estimated individual growth rate (i.e., the reliability of the slope of improvement) was calculated using HLM (Bryk & Raudenbush, 1992) allowing both the slope and the intercept to vary across students. Previous work suggested that students with at least 14 recorded data points over 36 weeks would provide a stable and reasonable estimate (Good, 2009; Good, et al., 2010). For all measures except Daze, a minimum of 14 data points were used to calculate slope (range = 14 to 40). For Daze, a minimum of 6 data points were used to calculate slope (range = 6 to 31). Reliability of the slope is reported in Table 1.

Reliability for Benchmark Administration

For alternate-form and test-retest reliability, all measures were given within a two-week time period and their scores were correlated. For evaluating scoring reliability, or rater-agreement, randomly selected students were administered the measures and were scored simultaneously by two assessors. Reliability for the alternate-form, test-retest, and inter-rater reliability is reported in Table 2.

Criterion-Related Validity

Concurrent and predictive criterion-related validity of *DIBELS Next* is presented as the correlation between the *DIBELS Next* Composite Score and the Group Reading Assessment and Diagnostic Evaluation (GRADE) (Williams, 2001) administered at the end of the 2009-2010 school year. For more information about criterion-related validity of *DIBELS Next*, please see the *DIBELS Next Technical Manual* available for download from <http://DIBELS.org/pubs.htm>. Criterion-related validity is reported in Table 3.

Other Technical Adequacy Information

The standard error of measurement is reported in Table 4. Sensitivity, specificity, and the area under the ROC analysis curve (AUC) are reported in Table 5. Internal consistency reliability for kindergarten through third-grade for the *DIBELS Next* Composite Score is reported in Table 6.

Table 1. Reliability for the Slope of Improvement for DIBELS Next

DIBELS Next Measure	Grade						
	K	1	2	3	4	5	6
First Sound Fluency	.90	--	--	--	--	--	--
Sample size (N)	2298	--	--	--	--	--	--
Phoneme Segmentation Fluency	.86	.88	--	--	--	--	--
Sample size (N)	1752	509	--	--	--	--	--
NWF Correct Letter Sounds	.86	.87	.83	--	--	--	--
Sample size (N)	779	15214	1555	--	--	--	--
NWF Whole Words Read	.90	.88	.85	--	--	--	--
Sample size (N)	292	14851	1550	--	--	--	--
DORF Words Correct/Min	--	.82	.77	.55	.56	.50	.50
Sample size (N)	--	356	2051	843	1010	610	102
Daze	--	--	--	.62	.61	.42	.35
Sample size (N)	--	--	--	1562	471	396	570

Note. Based on Samples 1, 2, and 3 data.

Table 2. Inter-Rater, Alternate-Form, and Test-Retest Reliability Estimates for DIBELS Next

DIBELS Next Measure	Grade						
	K	1	2	3	4	5	6
First Sound Fluency							
Inter-Rater	.94	--	--	--	--	--	--
Single-Form Alternate-Form	.85	--	--	--	--	--	--
Three-Form Alternate-Form	.95	--	--	--	--	--	--
Single-Form Test-Retest	--	--	--	--	--	--	--
Three-Form Test-Retest	--	--	--	--	--	--	--
Phoneme Segmentation Fluency							
Inter-Rater	.96	.95	--	--	--	--	--
Single-Form Alternate-Form	.84	.83	--	--	--	--	--
Three-Form Alternate-Form	.94	.93	--	--	--	--	--
Single-Form Test-Retest	--	--	--	--	--	--	--
Three-Form Test-Retest	--	--	--	--	--	--	--
NWF Correct Letter Sounds							
Inter-Rater	.99	.99	--	--	--	--	--
Single-Form Alternate-Form	.84	.85	.82	--	--	--	--
Three-Form Alternate-Form	.94	.94	.93	--	--	--	--
Single-Form Test-Retest	--	.76	--	--	--	--	--
Three-Form Test-Retest	--	.90	--	--	--	--	--
NWF Whole Words Read							
Inter-Rater	.99	.99	--	--	--	--	--

Single-Form Alternate-Form	.92	.90	.83	--	--	--	--
Three-Form Alternate-Form	.97	.96	.93	--	--	--	--
Single-Form Test-Retest	--	.70	--	--	--	--	--
Three-Form Test-Retest	--	.88	--	--	--	--	--
DORF Words Correct/Min							
Inter-Rater	--	--	.99	.99	.99	.99	.99
Single-Form Alternate-Form	--	.95	.91	.93	.90	.92	.84
Three-Form Alternate-Form	--	.98	.96	.97	.95	.96	.90
Single-Form Test-Retest	--	.95	.91	.93	.97	.97	--
Three-Form Test-Retest	--	.98	.97	.98	.99	.99	--
Daze							
Inter-Rater	--	--	--	.99	.98	.99	.99
Single-Form Alternate-Form	--	--	--	.76	.79	.77	.79
Three-Form Alternate-Form	--	--	--	.90	.92	.91	.92
Single-Form Test-Retest	--	--	--	--	--	--	--
Three-Form Test-Retest	--	--	--	--	--	--	--
DIBELS Next Composite Score							
Inter-Rater	.97	.99	.98	--	--	--	--
Single-Form Alternate-Form	.66	.95	.92	.97	.95	.91	.91
Three-Form Alternate-Form	.85	.98	.97	.99	.98	.97	.97
Single-Form Test-Retest	--	.94	.81	--	--	--	--
Three-Form Test-Retest	--	.98	.93	--	--	--	--

Note. Based on data from Samples 1, 2, 3, and 4. Alternate-form reliability for kindergarten measures FSF, PSF, NWF CLS, first-grade PSF, second-grade NWF CLS and NWF WWR, and Daze in all grades is calculated from progress monitoring data that was administered over

approximately 36 weeks; the correlation represents the median reliability from all possible pair-wise assessments that were given in consecutive weeks. Alternate-form reliability for DORF is the median reliability from all possible pair-wise correlations between 20 passages administered over four to seven days (two to five passages per day). Alternate-form reliability forms for kindergarten LNF, NWF WWR, and first-grade NWF, and all test-retest forms were given after an approximate two-week delay after middle-of-year benchmark assessment. Test-retest reliability unavailable for Daze, all kindergarten and sixth-grade measures.

Table 3. Predictive and Concurrent Criterion-Related Validity for DIBELS Next

DIBELS Next Measure	Grade						
	K	1	2	3	4	5	6
First Sound Fluency							
Predictive	.52	--	--	--	--	--	--
Concurrent	--	--	--	--	--	--	--
Phoneme Segmentation Fluency							
Predictive	.34	.33	--	--	--	--	--
Concurrent	.24	--	--	--	--	--	--
NWF Correct Letter Sounds							
Predictive	.47	.51	.51	--	--	--	--
Concurrent	.40	.56	--	--	--	--	--
NWF Whole Words Read							
Predictive	.19	.52	.51	--	--	--	--
Concurrent	.35	.56	--	--	--	--	--
DORF Words Correct/Min							
Predictive	--	.64	.76	.67	.77	.65	.59
Concurrent	--	.75	.73	.66	.74	.65	.61
Daze							
Predictive	--	--	--	.65	.67	.56	.60
Concurrent	--	--	--	.67	.68	.66	.64
DIBELS Next Composite Score							
Predictive	.48	.71	.80	.78	.80	.76	.68

Concurrent	.40	.77	.75	.75	.80	.77	.73
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Note. Based on Sample 4 data. Total sample size = 1306. *DIBELS Next* validity based on correlations with the Group Reading Assessment and Diagnostic Evaluation (GRADE) Total Test Raw Score which was administered at end-of-year benchmark administration. Concurrent validity is not currently available for FSF, first-grade PSF, and second-grade NWF, because those measures are not administered at the end of the year.

Table 4. Standard Error of Measurement of DIBELS Next Measures

<i>DIBELS Next</i> Measure	Grade						
	K	1	2	3	4	5	6
First Sound Fluency	4.68	--	--	--	--	--	--
Phoneme Segmentation Fluency	7.57	5.16	--	--	--	--	--
NWF Correct Letter Sounds	5.82	12.59	--	--	--	--	--
NWF Whole Words Read	1.15	4.27	--	--	--	--	--
DORF Words Correct/Min	--	5.56	8.00	7.00	8.53	7.66	7.00
Daze	--	--	--	3.91	4.00	4.68	2.95
<i>DIBELS Next</i> Composite Score	28.46	22.35	28.23	20.69	25.17	31.57	15.19

Note. SEM calculated using alternate-form reliability estimates from data in Samples 2 and 4.

Table 5. Sensitivity, Specificity, and Area Under the Curve (AUC) for DIBELS Next Measures

DIBELS Next Measure	Grade						
	K	1	2	3	4	5	6
First Sound Fluency							
Sensitivity	.34	--	--	--	--	--	--
Specificity	.88	--	--	--	--	--	--
AUC	.72	--	--	--	--	--	--
Phoneme Segmentation Fluency							
Sensitivity	.09	.24	--	--	--	--	--
Specificity	.89	.75	--	--	--	--	--
AUC	.56	.65	--	--	--	--	--
NWF Correct Letter Sounds							
Sensitivity	.24	.50	--	--	--	--	--
Specificity	.75	.83	--	--	--	--	--
AUC	.69	.80	--	--	--	--	--
NWF Whole Words Read							
Sensitivity	--	.50	--	--	--	--	--
Specificity	--	.81	--	--	--	--	--
AUC	--	.78	--	--	--	--	--
DORF Words Correct/Min							
Sensitivity	--	.67	.75	.61	.69	.61	.38
Specificity	--	.92	.89	.87	.79	.83	.90
AUC	--	.92	.89	.87	.87	.83	.85

Daze							
Sensitivity	--	--	--	.65	.69	.48	.25
Specificity	--	--	--	.88	.78	.78	.90
AUC	--	--	--	.86	.80	.82	.84
DIBELS Next Composite Score							
Sensitivity	.10	.70	.75	.74	.77	.68	.50
Specificity	.85	.88	.89	.90	.84	.88	.93
AUC	.66	.90	.88	.90	.88	.88	.92

Note. Based on Sample 4 data. Information not available for *DIBELS Next* measures that do not have a benchmark goal for the grade-level.

Table 6. Internal Consistency Reliability for *DIBELS Next* Composite Score

<i>DIBELS Next</i> Composite Score by Time of Year	Grade			
	K	1	2	3
Beginning of Year	--	.76	.89	.85
Middle of Year	.83	.90	.83	.84

Note. Based on Sample 5 data. Sample size approximately N = 1,150,000.

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