mCLASS Reading 3D with Flex Research Report

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Introduction to Online Administration of TRC

Text Reading and Comprehension (TRC) Online for Grades 3 through 6 is the computer-based version of mCLASS TRC, a leveled reading assessment that helps educators select appropriate reading materials for students and monitor overall reading growth. TRC Online assesses silent reading fluency and comprehension with increasingly complex texts to identify a student's independent reading level. Students are timed as they silently read a TRC Online book, and then they answer a set of comprehension questions to evaluate their level of understanding.
Thresholds for fluency and comprehension guide students up or down through the text levels until they reach a final independent level.

This research brief describes initial results for the relationship between online and observational administration of TRC and for the reliability and validity of TRC Online based on a study conducted during each benchmark period of the 2016-2017 school year (Beginning of Year, BOY; Middle of Year, MOY; and End of Year, EOY). The research will continue in the 2017-2018 school year to establish additional evidence for reliability and validity.

TRC Online Research Overview

Purpose: The purpose of this study was to investigate how student performance on TRC Online compared to performance on TRC, to determine expectations for silent reading fluency and comprehension for the online assessment, and to establish initial evidence for the reliability and validity of the TRC Online approach. Results were used to guide refinements to the content as well as to set performance thresholds for the new assessment.

Recruitment: Recruitment was focused on current Amplify customers, and outreach was conducted by the Amplify Account Management and Sales teams. The following criteria were used to screen for eligible participants: a) school must demonstrate a range of student reading proficiency levels, b) school must demonstrate a variety of demographic characteristics, c) school must have students in any or all of grades kindergarten through six, and d) school must contribute a minimum of 50 students (or 2 classrooms) per grade.

Participants: The study was conducted during the 2016-2017 academic year, with performance data collected around each benchmark period (BOY, MOY, EOY). In total, 720 students in grades kindergarten through 6 were assessed in three schools representing two school districts.

Demographic Information: Participants in this field study were educators and students from the following geographic divisions: New England and Middle Atlantic (US Census Bureau, n.d.). Demographic information including gender, ethnicity, Free and Reduced Price Lunch Eligibility (FRL, an indicator of socioeconomic status), and English Language Learner status (ELL) is provided in Table 1 for the students who took TRC Online as part of the study.

Table 1: Sample Size, Demographics, and mCLASS:DIBELS Next Benchmark Status by Grade

	All	Grade 3	Grade 4	Grade 5	Grade 6
Sample Size (n)					
Districts	2	2	2	2	2
Schools	3	3	3	3	3
Students	720	167	182	176	195
Gender (n)					
Female	313 (43%)	66 (40%)	81 (45%)	76 (43%)	90 (46%)
Male	363 (50%)	91 (54%)	94 (52%)	93 (53%)	85 (44%)
Gender Not Specified	44 (6%)	10 (6%)	7 (4%)	7 (4%)	20 (10%)
Ethnicity (n)					
White	240 (33%)	56 (34%)	60 (33%)	46 (26%)	78 (40%)
Hispanic	253 (35%)	60 (36%)	65 (36%)	66 (38%)	62 (32%)
Black	111 (15%)	27 (16%)	26 (14%)	36 (20%)	22 (11%)
Native American	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Asian	14 (2%)	4 (2%)	3 (2%)	5 (3%)	2 (1%)
Multiracial	31 (4%)	6 (4%)	13 (7%)	7 (4%)	5 (3%)
Ethnicity Not Specified	71 (10%)	14 (8%)	15 (8%)	16 (9%)	26 (13%)
Other demographics (n)					
FRL Eligible	424 (59%)	108 (65%)	103 (57%)	102 (58%)	111 (57%)
FRL Not Eligible	225 (31%)	45 (27%)	64 (35%)	58 (33%)	58 (30%)
FRL Status Not Specified	71 (10%)	14 (8%)	15 (8%)	16 (9%)	26 (13%)
ELL	17 (2%)	6 (4%)	4 (2%)	3 (2%)	4 (2%)
Non-ELL	632 (88%)	147 (88%)	163 (90%)	157 (89%)	165 (85%)
ELL Status Not Specified	71 (10%)	14 (8%)	15 (8%)	16 (9%)	26 (13%)

Research Design: At each benchmarking period, students were administered four assessments: mCLASS TRC, mCLASS:DIBELS Next, TRC Online, and STAR Reading (Renaissance Learning, 2011). Students were assigned three TRC Online books at levels at and around their mCLASS

TRC Instructional Level at each benchmarking period. Because all the assessments were designed to be sensitive to small changes in student reading skills, schools were instructed to administer mCLASS TRC, mCLASS:DIBELS Next, and TRC Online within two weeks of each other and to administer STAR Reading within two weeks of administering TRC Online. Actual testing intervals between assessments are shown in Table 2. Across all three benchmarking periods, for mCLASS TRC and TRC Online, 3-16 percent of the sample met this 2-week threshold, while an additional 41-62 percent administered both assessments within a 4-week period. At BOY, the majority of students were administered TRC Online, mCLASS:DIBELS Next and STAR Reading within 6 weeks or less, while at MOY and EOY, most students were administered these three assessments within 4 weeks or less.

Table 2: Testing Intervals between TRC Online, mCLASS TRC, mCLASS:DIBELS Next and STAR Reading

Testing Interval	mCLASS TRC and TRC Online	mCLASS:DIBELS Next and TRC Online	TRC Online and STAR Reading	mCLASS TRC and STAR Reading
BOY				
0-2 weeks	3%	6%	3%	97%
2-4 weeks	45%	41%	43%	0%
4-6 weeks	46%	43%	53%	1%
6+ weeks	7%	10%	1%	2%
MOY				
0-2 weeks	16%	22%	19%	91%
2-4 weeks	62%	61%	56%	6%
4-6 weeks	22%	16%	26%	3%
6+ weeks	0%	0%	0%	0%
EOY				
0-2 weeks	7%	4%	75%	20%
2-4 weeks	41%	42%	24%	72%
4-6 weeks	52%	53%	1%	8%
6+ weeks	0%	0%	0%	0%

The mCLASS TRC and mCLASS:DIBELS Next data were collected by a combination of classroom teachers, reading coaches, and Amplify data collectors. Data collectors were required to attend training and also were subjected to reliability checks to ensure adequate understanding and ability to administer assessments with fidelity. The TRC Online assessments were administered to students by classroom teachers and reading coaches in the school computer lab, with some initial support from Amplify trainers. All participants received study-specific training to familiarize them with assessment administration procedures.

mCLASS:DIBELS Next and STAR Reading were administered to students in order to support validity and comparability analyses. mCLASS:DIBELS Next (Good, et al., 2013) is a set of screening measures used three times per year to assess literacy skills; in Grades 3-6, mCLASS:DIBELS Next includes DIBELS Oral Reading Fluency (DORF), a measure of advanced phonics and word attack skills, accuracy and fluency with connected text, and Retell Fluency (RTF) and Daze, which both measure reading comprehension. Students are administered mCLASS:DIBELS Next DORF and RTF in a one-on-one, observational setting, and administration takes approximately 10 minutes per student; an additional 3 minutes of group-administration time is required for Daze. A student's overall composite score is calculated based on his or her scores on grade-specific measures to provide an overall indication of reading skill.

STAR Reading is a computer-adaptive assessment that tests students in 5 content domains: Word Knowledge and Skills, Comprehension Strategies and Constructing Meaning, Analyzing Literary Text, Understanding Author's Craft, and Analyzing Argument and Evaluating Text (Renaissance Learning, 2015). Students in grades 3-6 are administered 20 vocabulary-in-context (i.e., cloze) items and five authentic text passages with multiple-choice literal or inferential questions. Students respond to these questions using a mouse or keyboard. STAR Reading takes approximately 10–15 minutes for students to complete. Administration of STAR Reading was overseen by classroom teachers and reading coaches. Amplify research staff trained STAR Reading administrators prior to administering the assessment.

Descriptive Statistics: Descriptive information for mCLASS TRC, TRC Online, mCLASS:DIBELS Next, DIBELS Online, and STAR Reading is provided in Tables 3, 4, 5, and 6, respectively, by grade.

Table 3 shows student performance on mCLASS TRC by grade and benchmarking period. Over half of the students in each grade were Proficient or Above Proficient on mCLASS TRC, ranging from 53-82 percent across grades and benchmarking periods, while the remaining 18-47 percent performed Below or Far Below Proficient.

Table 3: Descriptive Statistics for mCLASS TRC by Grade

Grade	Beginning of Year				Middle of Year				End of Year			
	Far Below Proficient	Below Proficient	Proficient	Above Proficient	Far Below Proficient	Below Proficient	Proficient	Above Proficient	Far Below Proficient	Below Proficient	Proficient	Above Proficient
3	13%	10%	34%	44%	11%	15%	22%	52%	10%	14%	32%	45%
4	10%	26%	31%	33%	20%	27%	10%	43%	22%	11%	10%	58%
5	11%	8%	26%	56%	10%	12%	9%	69%	13%	5%	9%	73%
6	17%	22%	20%	40%	21%	3%	24%	53%	9%	16%	75%	0%

Table 4 shows student fluency and comprehension performance by grade and benchmarking period on TRC Online books that were at the student's mCLASS TRC Instructional Level. For example, if a student's Instructional Level on mCLASS TRC was Level L, their results for a Level L book on TRC Online are reported in Table 4. Note that at BOY and MOY, each TRC Online book was accompanied by 5 comprehension items, while at EOY, the number of items was increased to 8 to improve the reliability of the Comprehension score. There is a general pattern of increasing scores within each grade on both fluency and comprehension (with a larger jump in comprehension from MOY to EOY due to the additional 3 items at EOY). Fluency scores for a given benchmarking period also increase as grade increases.

Table 4: Descriptive Statistics for TRC Online Measures by Grade for Students Reading TRC Online Books at Their mCLASS TRC Instructional Level

Measure	Beginning of Year			Middle of Year			End of Year		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
Grade 3									
TRC Online Fluency	152	73.08	25.55	152	89.55	32.14	132	85.5	37.75
TRC Online Comprehension	152	3.47	1.2	152	3.53	1.27	132	5.58	1.98
Grade 4									
TRC Online Fluency	158	82.54	28.01	166	93.93	27.45	160	107.01	46.54
TRC Online Comprehension	158	3.26	1.25	166	3.55	1.28	160	5.15	1.91
Grade 5									
TRC Online Fluency	156	92.16	28.01	145	108.3	36.41	129	116.72	54.25
TRC Online Comprehension	156	3.35	1.27	145	3.74	1.08	129	5.29	1.84
Grade 6									
TRC Online Fluency	172	107.61	51.3	148	116.77	41.07	133	155.8	83.49
TRC Online Comprehension	172	3.49	1.33	148	3.77	1.18	133	5.24	1.82

Note: Unreasonably fast readers (fluency score > 500) and students who ran out of time without taking any action have been removed from the analysis.

Table 5 shows student performance on mCLASS:DIBELS Next by grade and benchmark period. At each time of year, approximately 55-60 percent of the overall sample performed At or Above Benchmark on mCLASS:DIBELS Next, while approximately 40-45 percent of the sample performed Below or Well Below Benchmark.

Table 5: Descriptive Statistics for mCLASS:DIBELS Next by Grade

Grade	Beginning of Year				Middle of Year				End of Year			
	Well Below	Below	At	Above	Well Below	Below	At	Above	Well Below	Below	At	Above
3	19	19	44	67	21	25	40	61	17	17	36	59
	(13%)	(13%)	(30%)	(45%)	(14%)	(17%)	(27%)	(41%)	(13%)	(13%)	(28%)	(46%)
4	44	24	39	53	71	20	38	38	28	37	41	51
	(28%)	(15%)	(24%)	(33%)	(43%)	(12%)	(23%)	(23%)	(18%)	(24%)	(26%)	(32%)
5	11	50	11	38	30	35	18	56	19	32	18	18
	(10%)	(45%)	(10%)	(35%)	(22%)	(25%)	(13%)	(40%)	(22%)	(37%)	(21%)	(21%)
6	30	60	47	21	12	35	62	39	22	25	50	37
	(19%)	(38%)	(30%)	(13%)	(8%)	(24%)	(42%)	(26%)	(16%)	(19%)	(37%)	(28%)

Table 6 shows student performance on STAR Reading. In Grades 3 and 5, student mean and median performance on STAR Reading increases across benchmarking periods within a grade, while in Grades 4 and 5, an increase in performance was observed from BOY to MOY, while a decrease in performance was observed from MOY to EOY.

Table 6: Descriptive Statistics for STAR Reading Scale Score by Grade

Grade	Beginning of Year				Middle of Year				End of Year			
	N	Mean	SD	Grade-Level Expectation	N	Mean	SD	Grade-Level Expectation	N	Mean	SD	Grade-Level Expectation
3	153	307.30	129.68	219	148	407.03	141.30	246	136	424.57	146.83	273
4	158	409.40	126.35	299	166	459.62	135.67	331	83	438.04	154.71	361
5	154	509.93	156.08	392	148	566.70	194.90	420	74	594.00	207.93	447
6	162	569.46	224.39	474	148	635.71	228.15	504	79	616.43	217.99	534

Reliability

Because no students are administered all books or all comprehension items in TRC Online, the typical indicator of internal consistency, Cronbach's alpha, is an inappropriate measure of reliability. Marginal reliability (Sireci, Thissen, & Wainer, 1991) is a more appropriate reliability measure under the Item Response Theory (IRT) framework. Marginal reliability was calculated to provide evidence for the internal consistency of the TRC Online book set for overall book performance (taking both fluency and comprehension into account). The marginal reliabilities for TRC Online text levels D-Z are shown in Table 7. Levels A-C have been excluded from the reliability analyses, as the focus of this report is on Grades 3 through 6 and fewer than 10 students in these grades were administered books at each of levels A-C. Marginal reliability is over 0.90 across Grades 3-6, providing strong evidence for the internal consistency of TRC Online.

Table 6: Internal Consistency of TRC Online Overall Book Performance

Grade	Beginning of Year		Middle of Year		End of Year	
	N	Marginal Reliability	N	Marginal Reliability	N	Marginal Reliability
3	153	0.99	148	1.00	132	0.98
4	149	0.98	167	0.98	162	0.98
5	157	0.97	153	0.98	150	0.98
6	180	0.99	148	0.99	151	0.99

Validity

Concurrent validity results between TRC Online Comprehension and STAR Reading Scale Score and between TRC Online Fluency and mCLASS:DIBELS Next DORF Words Correct and Composite Score are shown in Tables 7 and 8, respectively.

For TRC Online Comprehension, the analyses only included data from students reading books that they would be expected to read at their grade level, based on the mCLASS TRC Atlas

Performance Standards. For example, the Proficient levels for Grade 3 at BOY are L-M, so the correlation analysis for BOY Grade 3 included only Grade 3 students who read L-M books. For each comparison, all students who took each pair of measures were included in the analyses, regardless of the time interval between assessments. Overall, correlations between TRC Online Comprehension score and STAR Reading Scale Score were moderate to strong. The strongest correlations were found at EOY, after the number of TRC Online Comprehension items was increased from 5 to 8 items. Additional validity evidence for TRC Online Comprehension will be collected in the 2017-2018 school year.

Table 7: Concurrent Validity of TRC Online Comprehension with STAR Reading Scale Score

Grade	Beginning of Year		Middle of Year		End of Year	
	TRC Online Proficient Levels	Correlation with STAR Reading Scale Score	TRC Online Proficient Levels	Correlation with STAR Reading Scale Score	TRC Online Proficient Levels	Correlation with STAR Reading Scale Score
3	L-M	0.43	N	0.30	O-P	0.43
4	O-P	0.40	Q	0.39	R-S	0.58
5	R-S	0.40	T	0.46	U-V	0.69
6	U-V	0.36	W-X	0.29	Y-Z	0.44

For TRC Online Fluency, all books were included in the concurrent validity analyses with mCLASS:DIBELS Next DORF Words Correct and Composite Score, and all students who took each pair of measures were included in the analyses, regardless of the time interval between assessments. For both mCLASS:DIBELS Next DORF Words Correct, a measure of oral reading fluency and accuracy, and mCLASS:DIBELS Next Composite score, an overall measure of reading proficiency, correlations were strong for Grade 3 students, and tended to be more moderate for Grade 4-6 students. Correlations generally improved across the school year.

At BOY, students read TRC Online books out loud, while at MOY and EOY, students read silently, based on the observation that silent reading was more natural for students in these older elementary grades. Thus, the improved correlations for TRC Online Fluency at MOY and EOY may in part be due to the switch from oral to silent reading. Additional validity evidence for TRC Online Fluency as a silent reading measure will be collected in the 2017-2018 school year.

Table 8: Concurrent Validity of TRC Online Fluency with mCLASS:DIBELS Next DORF Words Correct and Composite Score

Grade	Beginning of Year		Middle of Year		End of Year	
	Correlation with mCLASS:DIBELS Next DORF Words Correct	Correlation with mCLASS:DIBELS Next Composite Score	Correlation with mCLASS:DIBELS Next DORF Words Correct	Correlation with mCLASS:DIBELS Next Composite Score	Correlation with mCLASS:DIBELS Next DORF Words Correct	Correlation with mCLASS:DIBELS Next Composite Score
3	0.55	0.57	0.53	0.59	0.62	0.65
4	0.24	0.10	0.29	0.29	0.44	0.40
5	0.15	0.22	0.36	0.44	0.32	0.33
6	0.34	0.41	0.39	0.46	0.35	0.49

Performance Thresholds

Data collected at the EOY benchmarking period of the 2016-2017 school year were used to set performance thresholds for TRC Online Comprehension and Fluency scores, which are used to find a student's TRC Online Independent Reading Level. Table 9 presents the descriptive statistics for TRC Online Comprehension scores by grade and mCLASS:DIBELS Next Benchmark Status. Across grades, the mean and median TRC Online Comprehension scores range from 5 to 6 for students who are At or Above Benchmark on mCLASS:DIBELS Next and below 6 for students scoring Below and Well Below Benchmark on mCLASS:DIBELS Next.

Table 7: Concurrent Validity of TRC Online Comprehension with STAR Reading Scale Score

Grade	mCLASS DIBELS:Next Benchmark Status	N	Mean	Median
3	Above Benchmark	61	5.70	6
	At Benchmark	37	4.93	5
	Below Benchmark	18	4.36	5
	Well Below Benchmark	23	3.66	4
4	Above Benchmark	52	4.93	5
	At Benchmark	41	5.07	5
	Below Benchmark			
	Well Below Benchmark	37	4.61	5
5	Above Benchmark	28	3.80	4
	At Benchmark	32	5.71	6
	Below Benchmark	29	5.43	6
	Well Below Benchmark	51	4.51	5
6	Above Benchmark	27	3.89	4
	At Benchmark	39	5.77	6
	Below Benchmark	57	5.11	5
	Well Below Benchmark	30	3.93	4

A logistic regression model was applied to further examine potential thresholds for TRC Online Comprehension. The logistic regression model uses TRC Online Comprehension score to predict whether a student would be At or Above Benchmark on mCLASS:DIBELS Next. At and Above Benchmark performance on mCLASS:DIBELS Next is considered passing, while Below and Well Below Benchmark performance is considered not passing. Table 10 reports the likelihood of passing mCLASS:DIBELS Next given each TRC Online Comprehension score. A student who scored 6 has a 79 percent chance of being At or Above Benchmark on mCLASS:DIBELS Next in Grade 3, a 64 percent chance in Grade 4, a 53 percent chance in Grade 5, and a 75 percent chance in Grade 6. A threshold of 6 also aligns with the results observed in Table 9 for Above Benchmark students on mCLASS:DIBELS Next, and it allows students some room for error.
Overall, a score of 6 seems to be the most reasonable performance threshold for passing TRC Online Comprehension. Thresholds will continue to be examined in the 2017-2018 school year.

Table 7: Concurrent Validity of TRC Online Comprehension with STAR Reading Scale Score

Comprehension	Grade 3	Grade 4	Grade 5	Grade 6
0	33.07%	39.36%	11.98%	19.82%
1	40.98%	43.50%	16.25%	27.33%
2	49.38%	47.73%	21.68%	36.40%
3	57.82%	51.99%	28.29%	46.56%
4	65.83%	56.23%	36.01%	57.00%
5	73.02%	60.38%	44.51%	66.86%
6	79.18%	64.38%	53.36%	75.43%
7	84.23%	68.19%	61.99%	82.37%
8	88.25%	71.78%	69.93%	87.67%

Table 11 summarizes the recommended performance thresholds for TRC Online Fluency for text levels D-Z. Again, levels A-C have been excluded from the analyses, as the focus of this report is on Grades 3 through 6 and fewer than 10 students in these grades were administered books at each of levels A-C. The TRC Online Fluency ranges in Table 11 represent expected silent reading rates for students reading grade-level books at an Independent level, based on the mCLASS TRC Atlas Performance Standards for each grade. The low scores in the table are the median fluency scores of students with Below Benchmark performance on mCLASS:DIBELS Next, and the high scores are the median fluency scores of students with Above Benchmark performance on mCLASS:DIBELS Next. Unreasonably fast readers (fluency score > 500) and students who ran out of time without taking any action were removed from the analyses. As seen in Table 11, the fluency expectations increase across the grade and text level bands. These thresholds will continue to be examined in the 2017-2018 school year.

Table 11: Performance Thresholds for TRC Online Fluency

Grade and Text Level	Low Score	High Score
Grade 1: D-I	37	55
Grade 2: J-M	49	72
Grade 3: N-P	65	86
Grade 4: Q-S	77	119
Grade 5: T-V	109	127
Grade 6: W-Z	120	143

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