Evaluation of Student Writing Performance in Grades 1–6 of the Marshalltown Community School District

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Student Reading Success Through Research and Collaboration

Tracking Marshalltown CSD Students' Writing Performance in Grades 1–6

In the 2019–2020 school year, the state implemented a new ESSA plan, in which student writing performance contributed 50% of a district's accountability for literacy outcomes. Previously, writing had not factored into the literacy accountability formula, so the Marshalltown Community School District (MCSD) was examining its instructional practices to determine how best to support teachers and students in this area. To that end, MCSD partnered with the IRRC to evaluate students' improvement in writing across the school year when scored by teachers and IRRC staff.

The IRRC developed writing prompts and scoring rubrics aligned to the state standards and Iowa Statewide Assessment of Student Progress (ISASP) for each grade level. MCSD personnel vetted the prompts to ensure appropriateness for the diverse students in the district and prepared teachers to use the IRRC rubrics for scoring students' responses. There were three waves of data collection planned (fall, winter, and spring) for all students. In each wave, students responded to a new informational writing prompt. There was no time limit set for students to complete their responses, but teachers were asked to finish the administration in one sitting.

This work began in 2019, but the ISASP rubrics changed slightly before the spring 2021 administration of the state test. That resulted in a couple of differences. First, the criterion "focus" on the IRRC rubric was changed to "task" on the ISASP rubric, but the intent and descriptors were the same. Second, the original rubrics used a 1–4 score range, which is how the IRRC rubrics were then constructed, but the revised ISASP rubrics used a 1–5 score range.

The plan for the project was for the IRRC to compare the scores of teachers who knew the students and their various background characteristics (e.g., race/ethnicity, special education status, EL status) to IRRC raters' scores of the same responses. Finally, the IRRC was to explore the extent to which teachers' rubric scores and IRRC rater scores predicted students' ISASP performance on both the written composition and the English Language Arts (ELA) composite. This report presents data gathered only in the 2020–2021 school year.

Descriptive information on the student participants in each grade level can be found in Appendix A. Note that the number of student responses varied from wave to wave.

Analytic Plan

The writing rubrics consisted of 5 components in Grades 1–2, due to the inclusion of Language Mechanics along with the Language Grammar component. Grades 3–6 rubrics had only a comprehensive Language component. Because writing prompts and rubrics focused only on the informational genre, students were scored on the same rubric components in each wave. Each writing component was scored on a 1–4 scale by teachers and the IRRC scorers, with higher scores

representing better quality of writing for that component. As a reminder, the ISASP scores applied a 1–5 scale.

Analyses focused on three key questions:
1. What is the agreement among the teachers', IRRC raters', and electronic indexes' scores of students' responses?
2. To what extent did students' scores change over the course of the fall, winter, and spring administrations?
3. How well do teacher and IRRC scores predict students' ISASP performance?

Before analyzing the data, we removed any students with missing scores or scores of zero, which indicated a student plagiarized or wrote in gibberish. An important consideration in addressing the research questions was the nesting of students within classrooms, so mixed-effect models were employed when possible. Analyses were performed in the R environment.

Results

Relationship Among Score Types

To answer the first question, we looked at the agreement between the teacher and IRRC scores for each writing component in all three waves. The results suggest the two score types are mostly moderately positively correlated but with some variation in magnitude across grade, criterion, and wave. This can be interpreted as suggesting the scores have considerable similarity but are not exactly alike. We could expect some variation in scores by type (teacher, IRRC), as can be seen in the tables in Appendix B showing the distribution of scores by type. This also would mean we could expect to see some differences in the results for students' fall-to-spring growth and the prediction of ISASP outcomes.

Student Writing Growth

To determine students' patterns of growth from fall to spring, we fit a cumulative logistic mixed model to take into account the ordinal nature of the scores. The models for each score type and criterion are provided in Appendix C. Of particular importance in the tables are the *Grade: Wave* rate of change estimates. Note that some are negative, suggesting that—on average—student writing performance in that skill area (focus/task, development, organization, language) declined over the year. Where the estimated rates of change are not statistically significant, as indicated by the absence of asterisks after the value, student growth can be interpreted as stagnant in that skill area.

In the Focus/Task criterion, IRRC scores revealed significantly positive growth in Grades 3, 5, and 6 with the greatest improvement in Grade 3. Students in Grades 1 and 2 had significantly negative growth, and those in Grade 4 had stagnant performance. However, when Focus/Task was measured by teachers, the model results suggested that students in Grades 1 and 5 experienced

significantly positive growth. All other grades were stagnant. Note that the Grade 1 teacher model results were directly contradictory to the IRRC model.

In the Development criterion, IRRC scores revealed significantly positive growth in Grades 4, 5, and 6 with the greatest improvement in Grade 5. Unfortunately, there was significantly negative growth in Grade 2, and stagnant performance in Grades 1 and 3. However, when Development was measured by teachers, the model results suggested that students in Grades 1 through 5 experienced significantly positive growth, and students in Grade 6 were stagnant. In direct contrast to the IRRC score model showing significant decline in Grade 2, the teacher score model showed that Grade 2 scores in Development experienced among the highest improvement. The greatest improvement on the teacher score model was in Grade 1, which the IRRC score model suggested was stagnant. Thus, there are considerably different pictures of students' growth created by the two types of scorers.

In the Organization criterion, IRRC scores revealed significantly positive growth only in Grade 5, but significantly negative growth in Grades 4 and 6. Students in Grades 1, 2 and 3 were stagnant. However, when Organization was measured by teachers, the model results suggested that students in Grades 1, 2, 3, and 5 experienced significantly positive growth. Students in Grade 6 had significantly negative growth, and those in Grade 4 were stagnant.

Although there were separate Language criteria for Mechanics and Grammar in Grades 1 and 2, results of the IRRC models were the same. That is, in both Mechanics and Grammar IRRC scores revealed significantly negative growth in Grade 2, and Grade 1 was stagnant. When Mechanics and Grammar were measured by teachers, the model results were directly opposite the IRRC model in Grade 2 because the teacher model showed significantly positive growth in this grade. Grade 1 Mechanics was stagnant in the teacher model, but Grammar was significantly positive.

In the Language criterion for Grades 3–6, IRRC scores revealed significantly positive growth in Grades 4, 5, and 6. There was significantly negative growth in Grade 3. However, when Language was measured by teachers, the model results suggested that students in Grades 3 and 4 experienced significantly positive growth. Students in Grades 5 and 6 were stagnant. Note that the teacher model results for Grade 3 were directly opposite the IRRC model results for that grade.

Prediction of ISASP Outcomes
Because students in Grades 1 and 2 do not take ISASP, these grade levels were excluded from the prediction analyses. We fit a linear mixed model that regressed the ISASP English language arts (ELA) scale score composite on the average teacher score and, in a separate model, on the average IRRC score. Each model incorporated the random effects in the intercept due to having the same homeroom teacher and the fixed effects due to student characteristics (i.e., gender, race/ethnicity, EL, FRL, and special ed). Due to model fit, gender and race/ethnicity were dropped from both the

teacher and IRRC score models, except for Grade 6 in the teacher model where gender and race/ethnicity were significant.

In comparing the final models for the two score types (and after adjusting for significant student characteristics), we used a robust estimation method to mitigate the impact of outlier student scores. Strictly speaking, we fit the median regression functions, not the mean regression functions. As indicated by the lower AIC values in Table 1 below, the IRRC scores were slightly better predictors of the ISASP ELA composite in all but Grade 5.

Table 1. Final Model Fit for Each Score Type's Prediction of the ISASP ELA

Grade	AIC for IRRC score	AIC for teacher score
3	2,301.921	2,303.227
4	2,393.655	2,419.817
5	2,430.237	2,396.926
6	1,753.239	1,775.329

Next, we fit linear mixed regression models to estimate how each score type predicted the ISASP ELA scale score composite. The model results by grade level can be found in Appendix D. In all grades, the average IRRC writing score had a positive relationship with the ISASP ELA composite scale score. Students identified as EL, FRL, or special ed tended to have a significantly lower ISASP ELA score than their peers, even though they received an identical average IRRC writing score. This suggests the manner of constructing the ELA composite score introduced a disadvantage to students with these characteristics. The teacher scores demonstrated similar patterns, though teacher scores had weaker regression relationships to the ISASP ELA scores than the IRRC writing scores did.

In addition, we fit a cumulative logistic link model to determine each score type's prediction of ISASP written composition rubric scores. Based on model fit, the teacher and IRRC rubric scores were comparably predictive of the ISASP rubric scores. However, scatter diagrams showed that the prediction was not very accurate for either score type. Thus, the use of individual criterion scores may not be as useful as an overall average rubric score for predicting students' ISASP performance.

The combined results suggest that the unbiased IRRC human scorers who followed a rigorous training and calibration process were better predictors overall of students' ISASP performance—

particularly the ELA scale score composite, which is the determiner of student proficiency and school accountability. Nevertheless, the composite score does not provide the level of detail that teachers need to plan targeted instruction. The analytic rubric would indicate more specific strengths and weaknesses for each student. Although neither the IRRC nor teacher rubric criterion score types were very accurate in predicting how ISASP's electronic scoring system would rate students' written compositions performance in each criterion, teachers' scores were at least comparable to IRRC scores. This suggests that interim writing assessments evaluated by the students' teachers could help guide instruction without requiring the intensity of resources that the IRRC's scoring process does. However, the differences in growth patterns based on the rubric scores suggests they should not be used for monitoring students over time.

Appendix A

Student Demographic Information

	Grade 1 (*N* = 307)	Grade 2 (*N* = 302)	Grade 3 (*N* = 361)	Grade 4 (*N* = 350)	Grade 5 (*N* = 369)	Grade 6 (*N* = 373)
Gender						
Female	155 (50.5%)	155 (51.3%)	151 (41.8%)	185 (52.9%)	171 (46.3%)	178 (47.7%)
Male	152 (49.5%)	147 (48.7%)	210 (58.2%)	165 (47.1%)	197 (53.4%)	195 (52.3%)
Race/Ethnicity						
White / Caucasian	90 (29.3%)	83 (27.5%)	109 (30.2%)	109 (31.1%)	103 (27.9%)	110 (29.5%)
Asian	40 (13.0%)	36 (11.9%)	34 (9.4%)	25 (7.1%)	25 (6.8%)	28 (7.5%)
Black / African American	12 (3.9%)	13 (4.3%)	20 (5.5%)	14 (4.0%)	9 (2.4%)	11 (2.9%)
Hispanic	155 (50.5%)	161 (53.3%)	174 (48.2%)	192 (54.9%)	217 (58.8%)	211 (56.6%)
Two or More Races	9 (2.9%)	8 (2.6%)	20 (5.5%)	8 (2.3%)	12 (3.3%)	11 (2.9%)
American Indian / Alaska Native	1 (0.3%)	1 (0.3%)	4 (1.1%)	1 (0.3%)	2 (0.5%)	1 (0.3%)
Hawaiian / Pacific Islander	0 (0%)	0 (0%)	0 (0%)	1 (0.3%)	0 (0%)	1 (0.3%)
ELL (English Language Learner)	177 (57.7%)	154 (51.0%)	122 (33.8%)	116 (33.1%)	107 (29.0%)	89 (23.9%)
FRL (Free or Reduced Lunch)	235 (76.5%)	228 (75.5%)	276 (76.5%)	275 (78.6%)	295 (79.9%)	281 (75.3%)
Special Education	32 (10.4%)	40 (13.2%)	54 (15.0%)	55 (15.7%)	69 (18.7%)	53 (14.2%)
Gifted	0 (0%)	12 (4.0%)	16 (4.4%)	67 (19.1%)	27 (7.3%)	16 (4.3%)

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Appendix B

Correlations Among Score Types by Grade, Wave, and Rubric Criterion

Grades 1 and 2

Grade	Wave	Focus/Task	Development	Organization	Language Mechanics	Language Grammar
1	1	0.35	0.44	0.48	0.09	0.24
2	1	0.55	0.35	0.47	0.43	0.49
1	2	0.40	0.36	0.14	0.49	0.33
2	2	0.54	0.51	0.27	0.47	0.43
1	3	0.49	0.49	0.37	0.34	0.37
2	3	0.45	0.49	0.45	0.49	0.50

Grades 3–6

Grade	Wave	Focus/Task	Development	Organization	Language
3	1	0.44	0.53	0.59	0.52
4	1	0.21	0.28	0.42	0.40
5	1	0.52	0.47	0.51	0.52
6	1	0.36	0.35	0.23	0.39
3	2	0.43	0.44	0.38	0.44
4	2	0.59	0.57	0.50	0.52
5	2	0.44	0.41	0.36	0.62
6	2	0.56	0.46	0.68	0.53
3	3	0.47	0.49	0.40	0.37
4	3	0.57	0.49	0.49	0.59
5	3	0.55	0.43	0.41	0.51

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Grade	Wave	Focus/Task	Development	Organization	Language
6	3	0.46	0.48	0.66	0.50

Distribution of Score Types by Wave

Wave 1

Grade	Component	Scoring Method		Score counts / Percentages 0	1	2	3	4	Mean Score
1	Focus/Task	IRRC	N	99	68	33	1	2	1.39
			%	48.77	33.5	16.26	0.49	0.99	
		Teacher	N	57	90	36	20	2	1.55
			%	27.8	43.9	17.56	9.76	0.98	
	Organization	IRRC	N	99	100	4	0	0	1.04
			%	48.77	49.26	1.97	0	0	
		Teacher	N	57	124	19	3	2	1.21
			%	27.8	60.49	9.27	1.46	0.98	
	Development	IRRC	N	99	98	6	0	0	1.06
			%	48.77	48.28	2.96	0	0	
		Teacher	N	57	123	21	3	1	1.20
			%	27.8	60	10.24	1.46	0.49	
	Language Grammar	IRRC	N	99	98	5	1	0	1.07
			%	48.77	48.28	2.46	0.49	0	
		Teacher	N	57	110	31	7	0	1.30
			%	27.8	53.66	15.12	3.41	0	
	Language Mechanics	IRRC	N	99	98	6	0	0	1.06
			%	48.77	48.28	2.96	0	0	
		Teacher	N	57	119	26	3	0	1.22
			%	27.8	58.05	12.68	1.46	0	
2	Focus/Task	IRRC	N	33	47	51	60	2	2.11
			%	17.1	24.35	26.42	31.09	1.04	
		Teacher	N	26	64	75	14	7	1.78
			%	13.98	34.41	40.32	7.53	3.76	
	Organization	IRRC	N	33	106	51	2	1	1.36
			%	17.1	54.92	26.42	1.04	0.52	
		Teacher	N	26	109	47	3	1	1.35
			%	13.98	58.6	25.27	1.61	0.54	
	Development	IRRC	N	33	52	73	34	1	1.90
			%	17.1	26.94	37.82	17.62	0.52	
		Teacher	N	26	100	52	6	2	1.44

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Grade	Component	Scoring Method		0	1	2	3	4	Mean Score
				Score counts / Percentages					
	Language Grammar	IRRC	%	13.98	53.76	27.96	3.23	1.08	1.84
			N	33	67	52	40	1	
		Teacher	%	17.1	34.72	26.94	20.73	0.52	1.34
			N	26	116	36	6	2	
	Language Mechanics	IRRC	%	13.98	62.37	19.35	3.23	1.08	1.86
			N	33	68	49	40	3	
		Teacher	%	17.1	35.23	25.39	20.73	1.55	1.35
			N	26	115	34	11	0	
			%	13.98	61.83	18.28	5.91	0	
3	Focus/Task	IRRC	N	19	72	142	19	0	1.77
			%	7.54	28.57	56.35	7.54	0	
		Teacher	N	26	64	116	47	1	1.93
			%	10.24	25.2	45.67	18.5	0.39	
	Organization	IRRC	N	19	164	68	1	0	1.30
			%	7.54	65.08	26.98	0.4	0	
		Teacher	N	26	113	73	42	0	1.69
			%	10.24	44.49	28.74	16.54	0	
	Development	IRRC	N	19	92	117	24	0	1.71
			%	7.54	36.51	46.43	9.52	0	
		Teacher	N	26	90	100	38	0	1.77
			%	10.24	35.43	39.37	14.96	0	
	Language	IRRC	N	19	98	109	26	0	1.69
			%	7.54	38.89	43.25	10.32	0	
		Teacher	N	26	90	87	51	0	1.83
			%	10.24	35.43	34.25	20.08	0	
	Focus/Task	IRRC	N	34	53	90	53	9	2.09
			%	14.23	22.18	37.66	22.18	3.77	
		Teacher	N	11	51	69	71	5	2.15
			%	5.31	24.64	33.33	34.3	2.42	
4	Organization	IRRC	N	34	78	103	21	3	1.75
			%	14.23	32.64	43.1	8.79	1.26	
		Teacher	N	11	67	79	49	1	1.92
			%	5.31	32.37	38.16	23.67	0.48	
	Development	IRRC	N	34	37	118	43	7	2.10
			%	14.23	15.48	49.37	17.99	2.93	

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

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Grade	Component	Scoring Method		Score counts / Percentages 0	1	2	3	4	Mean Score
		Teacher	N	11	58	78	58	2	2.02
			%	5.31	28.02	37.68	28.02	0.97	
	Language	IRRC	N	34	50	91	59	5	2.09
			%	14.23	20.92	38.08	24.69	2.09	
		Teacher	N	11	73	69	51	3	1.92
			%	5.31	35.27	33.33	24.64	1.45	
	Focus/Task	IRRC	N	26	45	117	39	4	2.01
			%	11.26	19.48	50.65	16.88	1.73	
		Teacher	N	19	61	90	53	8	2.04
			%	8.23	26.41	38.96	22.94	3.46	
	Organization	IRRC	N	26	59	137	9	0	1.76
			%	11.26	25.54	59.31	3.9	0	
		Teacher	N	19	75	90	44	3	1.88
			%	8.23	32.47	38.96	19.05	1.3	
5	Development	IRRC	N	26	60	90	52	3	1.99
			%	11.26	25.97	38.96	22.51	1.3	
		Teacher	N	19	76	95	35	6	1.86
			%	8.23	32.9	41.13	15.15	2.6	
	Language	IRRC	N	26	73	96	34	2	1.83
			%	11.26	31.6	41.56	14.72	0.87	
		Teacher	N	19	64	84	59	5	2.02
			%	8.23	27.71	36.36	25.54	2.16	
	Focus/Task	IRRC	N	25	42	122	35	4	2.00
			%	10.96	18.42	53.51	15.35	1.75	
		Teacher	N	4	21	91	67	42	2.59
			%	1.78	9.33	40.44	29.78	18.67	
	Organization	IRRC	N	25	45	116	37	5	2.01
			%	10.96	19.74	50.88	16.23	2.19	
6		Teacher	N	4	29	84	77	31	2.50
			%	1.78	12.89	37.33	34.22	13.78	
	Development	IRRC	N	25	31	104	60	8	2.22
			%	10.96	13.6	45.61	26.32	3.51	
		Teacher	N	4	25	85	79	32	2.53
			%	1.78	11.11	37.78	35.11	14.22	
	Language	IRRC	N	25	14	126	58	5	2.27

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Grade	Component	Scoring Method	Score counts / Percentages					Mean Score
			0	1	2	3	4	
		%	10.96	6.14	55.26	25.44	2.19	
	Teacher	N	4	27	79	86	29	2.53
		%	1.78	12	35.11	38.22	12.89	

Wave 2

Grade	Component	Scoring Method		Score counts / Percentages					Mean Score
				0	1	2	3	4	
1	Focus/Task	IRRC	N	84	103	47	2	0	1.34
			%	35.59	43.64	19.92	0.85	0	
		Teacher	N	56	73	65	34	5	1.84
			%	24.03	31.33	27.9	14.59	2.15	
	Organization	IRRC	N	84	146	5	1	0	1.05
			%	35.59	61.86	2.12	0.42	0	
		Teacher	N	56	145	21	10	1	1.25
			%	24.03	62.23	9.01	4.29	0.43	
	Development	IRRC	N	84	139	11	2	0	1.10
			%	35.59	58.9	4.66	0.85	0	
		Teacher	N	56	110	58	8	1	1.44
			%	24.03	47.21	24.89	3.43	0.43	
	Language Grammar	IRRC	N	84	142	8	2	0	1.08
			%	35.59	60.17	3.39	0.85	0	
		Teacher	N	56	130	39	8	0	1.31
			%	24.03	55.79	16.74	3.43	0	
	Language Mechanics	IRRC	N	84	139	12	1	0	1.09
			%	35.59	58.9	5.08	0.42	0	
		Teacher	N	56	152	20	5	0	1.17
			%	24.03	65.24	8.58	2.15	0	
2	Focus/Task	IRRC	N	27	122	64	11	2	1.46
			%	11.95	53.98	28.32	4.87	0.88	
		Teacher	N	37	116	40	20	6	1.54
			%	16.89	52.97	18.26	9.13	2.74	
	Organization	IRRC	N	27	126	70	2	1	1.39
			%	11.95	55.75	30.97	0.88	0.44	
		Teacher	N	37	114	56	12	0	1.44
			%	16.89	52.05	25.57	5.48	0	
	Development	IRRC	N	27	133	54	12	0	1.39
			%	11.95	58.85	23.89	5.31	0	
		Teacher	N	37	112	53	17	0	1.48
			%	16.89	51.14	24.2	7.76	0	
	Language	IRRC	N	27	96	94	8	1	1.57

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Grade	Component	Scoring Method		0	1	2	3	4	Mean Score
					Score counts / Percentages				
	Grammar		%	11.95	42.48	41.59	3.54	0.44	
		Teacher	N	37	113	51	18	0	1.48
			%	16.89	51.6	23.29	8.22	0	
	Language Mechanics	IRRC	N	27	107	70	20	2	1.58
			%	11.95	47.35	30.97	8.85	0.88	
		Teacher	N	37	114	49	17	2	1.49
			%	16.89	52.05	22.37	7.76	0.91	
3	Focus/Task	IRRC	N	11	54	187	23	0	1.88
			%	4	19.64	68	8.36	0	
		Teacher	N	23	103	97	50	2	1.81
			%	8.36	37.45	35.27	18.18	0.73	
	Organization	IRRC	N	11	226	34	4	0	1.16
			%	4	82.18	12.36	1.45	0	
		Teacher	N	23	124	103	25	0	1.61
			%	8.36	45.09	37.45	9.09	0	
	Development	IRRC	N	11	116	127	21	0	1.64
			%	4	42.18	46.18	7.64	0	
		Teacher	N	23	85	111	54	2	1.89
			%	8.36	30.91	40.36	19.64	0.73	
	Language	IRRC	N	11	127	121	16	0	1.58
			%	4	46.18	44	5.82	0	
		Teacher	N	23	92	108	51	1	1.85
			%	8.36	33.45	39.27	18.55	0.36	
4	Focus/Task	IRRC	N	15	79	125	56	3	1.94
			%	5.4	28.42	44.96	20.14	1.08	
		Teacher	N	6	86	99	68	19	2.07
			%	2.16	30.94	35.61	24.46	6.83	
	Organization	IRRC	N	15	149	96	17	1	1.51
			%	5.4	53.6	34.53	6.12	0.36	
		Teacher	N	6	102	116	47	7	1.85
			%	2.16	36.69	41.73	16.91	2.52	
	Development	IRRC	N	15	56	148	57	2	2.02
			%	5.4	20.14	53.24	20.5	0.72	
		Teacher	N	6	79	109	68	16	2.08
			%	2.16	28.42	39.21	24.46	5.76	

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Student Reading Success Through Research and Collaboration

Grade	Component	Scoring Method		0	1	2	3	4	Mean Score
				Score counts / Percentages					
	Language	IRRC	*N*	15	56	144	60	3	2.04
			%	5.4	20.14	51.8	21.58	1.08	
		Teacher	*N*	6	88	109	63	12	2.00
			%	2.16	31.65	39.21	22.66	4.32	
5	Focus/Task	IRRC	*N*	8	30	196	19	3	1.98
			%	3.12	11.72	76.56	7.42	1.17	
		Teacher	*N*	5	59	122	59	11	2.09
			%	1.95	23.05	47.66	23.05	4.3	
	Organization	IRRC	*N*	8	37	203	7	1	1.89
			%	3.12	14.45	79.3	2.73	0.39	
		Teacher	*N*	5	68	130	47	6	1.96
			%	1.95	26.56	50.78	18.36	2.34	
	Development	IRRC	*N*	8	60	161	27	0	1.87
			%	3.12	23.44	62.89	10.55	0	
		Teacher	*N*	5	66	124	55	6	2.00
			%	1.95	25.78	48.44	21.48	2.34	
	Language	IRRC	*N*	8	65	137	42	4	1.94
			%	3.12	25.39	53.52	16.41	1.56	
		Teacher	*N*	5	60	123	60	8	2.06
			%	1.95	23.44	48.05	23.44	3.12	
6	Focus/Task	IRRC	*N*	14	44	140	69	15	2.21
			%	4.96	15.6	49.65	24.47	5.32	
		Teacher	*N*	2	22	79	119	58	2.77
			%	0.71	7.86	28.21	42.5	20.71	
	Organization	IRRC	*N*	14	105	113	41	9	1.83
			%	4.96	37.23	40.07	14.54	3.19	
		Teacher	*N*	2	42	115	74	47	2.45
			%	0.71	15	41.07	26.43	16.79	
	Development	IRRC	*N*	14	25	148	84	11	2.30
			%	4.96	8.87	52.48	29.79	3.9	
		Teacher	*N*	2	22	107	102	47	2.63
			%	0.71	7.86	38.21	36.43	16.79	
	Language	IRRC	*N*	14	25	120	109	14	2.42
			%	4.96	8.87	42.55	38.65	4.96	
		Teacher	*N*	2	30	92	109	47	2.62

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Grade	Component	Scoring Method	Score counts / Percentages					Mean Score
			0	1	2	3	4	
		%	0.71	10.71	32.86	38.93	16.79	

Student Reading Success Through Research and Collaboration

Wave 3

Grade	Component	Scoring Method		Score counts / Percentages					Mean Score
				0	1	2	3	4	
1	Focus/Task	IRRC	N	83	142	22	4	0	1.18
			%	33.07	56.57	8.76	1.59	0	
		Teacher	N	60	72	62	45	8	1.94
			%	24.29	29.15	25.1	18.22	3.24	
	Organization	IRRC	N	83	162	5	1	0	1.04
			%	33.07	64.54	1.99	0.4	0	
		Teacher	N	60	142	22	17	6	1.40
			%	24.29	57.49	8.91	6.88	2.43	
	Development	IRRC	N	83	156	10	2	0	1.08
			%	33.07	62.15	3.98	0.8	0	
		Teacher	N	60	106	46	30	5	1.65
			%	24.29	42.91	18.62	12.15	2.02	
	Language Grammar	IRRC	N	83	159	8	1	0	1.06
			%	33.07	63.35	3.19	0.4	0	
		Teacher	N	60	113	54	17	3	1.52
			%	24.29	45.75	21.86	6.88	1.21	
	Language Mechanics	IRRC	N	83	159	9	0	0	1.05
			%	33.07	63.35	3.59	0	0	
		Teacher	N	60	149	25	12	1	1.28
			%	24.29	60.32	10.12	4.86	0.4	
2	Focus/Task	IRRC	N	20	82	123	18	0	1.71
			%	8.23	33.74	50.62	7.41	0	
		Teacher	N	23	87	92	39	2	1.80
			%	9.47	35.8	37.86	16.05	0.82	
	Organization	IRRC	N	20	139	79	5	0	1.40
			%	8.23	57.2	32.51	2.06	0	
		Teacher	N	23	110	84	24	2	1.63
			%	9.47	45.27	34.57	9.88	0.82	
	Development	IRRC	N	20	106	100	17	0	1.60
			%	8.23	43.62	41.15	7	0	
		Teacher	N	23	97	72	49	2	1.80
			%	9.47	39.92	29.63	20.16	0.82	
	Language	IRRC	N	20	135	81	7	0	1.43

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Student Reading Success Through Research and Collaboration

Grade	Component	Scoring Method		Score counts / Percentages					Mean Score
				0	1	2	3	4	
	Grammar		%	8.23	55.56	33.33	2.88	0	
		Teacher	N	23	108	80	31	1	1.66
			%	9.47	44.44	32.92	12.76	0.41	
	Language Mechanics	IRRC	N	20	144	72	7	0	1.39
			%	8.23	59.26	29.63	2.88	0	
		Teacher	N	23	110	74	34	2	1.67
			%	9.47	45.27	30.45	13.99	0.82	
3	Focus/Task	IRRC	N	15	36	101	142	0	2.38
			%	5.1	12.24	34.35	48.3	0	
		Teacher	N	22	92	111	64	5	1.93
			%	7.48	31.29	37.76	21.77	1.7	
	Organization	IRRC	N	15	212	63	4	0	1.25
			%	5.1	72.11	21.43	1.36	0	
		Teacher	N	22	108	128	35	1	1.74
			%	7.48	36.73	43.54	11.9	0.34	
	Development	IRRC	N	15	101	162	16	0	1.70
			%	5.1	34.35	55.1	5.44	0	
		Teacher	N	22	66	141	60	5	2.01
			%	7.48	22.45	47.96	20.41	1.7	
	Language	IRRC	N	15	139	127	13	0	1.55
			%	5.1	47.28	43.2	4.42	0	
		Teacher	N	22	78	100	90	4	2.07
			%	7.48	26.53	34.01	30.61	1.36	
4	Focus/Task	IRRC	N	16	55	140	78	4	2.11
			%	5.46	18.77	47.78	26.62	1.37	
		Teacher	N	6	59	116	81	22	2.24
			%	2.11	20.77	40.85	28.52	7.75	
	Organization	IRRC	N	16	144	115	18	0	1.55
			%	5.46	49.15	39.25	6.14	0	
		Teacher	N	6	88	136	42	12	1.92
			%	2.11	30.99	47.89	14.79	4.23	
	Development	IRRC	N	16	26	174	71	6	2.21
			%	5.46	8.87	59.39	24.23	2.05	
		Teacher	N	6	56	123	79	20	2.23
			%	2.11	19.72	43.31	27.82	7.04	

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Grade	Component	Scoring Method		Score counts / Percentages					Mean Score
				0	1	2	3	4	
	Language	IRRC	N	16	50	133	92	2	2.17
			%	5.46	17.06	45.39	31.4	0.68	
		Teacher	N	6	70	126	72	10	2.08
			%	2.11	24.65	44.37	25.35	3.52	
	Focus/Task	IRRC	N	2	12	139	106	6	2.40
			%	0.75	4.53	52.45	40	2.26	
		Teacher	N	2	57	100	85	21	2.27
			%	0.75	21.51	37.74	32.08	7.92	
	Organization	IRRC	N	2	27	225	11	0	1.94
			%	0.75	10.19	84.91	4.15	0	
		Teacher	N	2	62	127	67	7	2.07
			%	0.75	23.4	47.92	25.28	2.64	
5	Development	IRRC	N	2	15	124	122	2	2.42
			%	0.75	5.66	46.79	46.04	0.75	
		Teacher	N	2	30	124	99	10	2.34
			%	0.75	11.32	46.79	37.36	3.77	
	Language	IRRC	N	2	38	141	83	1	2.18
			%	0.75	14.34	53.21	31.32	0.38	
		Teacher	N	2	56	126	73	8	2.13
			%	0.75	21.13	47.55	27.55	3.02	
	Focus/Task	IRRC	N	11	33	138	106	7	2.31
			%	3.73	11.19	46.78	35.93	2.37	
		Teacher	N	0	28	96	122	50	2.66
			%	0	9.46	32.43	41.22	16.89	
	Organization	IRRC	N	11	140	103	31	10	1.69
			%	3.73	47.46	34.92	10.51	3.39	
		Teacher	N	0	54	131	74	37	2.32
6			%	0	18.24	44.26	25	12.5	
	Development	IRRC	N	11	15	145	118	6	2.40
			%	3.73	5.08	49.15	40	2.03	
		Teacher	N	0	33	107	108	48	2.58
			%	0	11.15	36.15	36.49	16.22	
	Language	IRRC	N	11	13	129	127	15	2.51
			%	3.73	4.41	43.73	43.05	5.08	
		Teacher	N	0	35	119	104	38	2.49

Grade	Component	Scoring Method	Score counts / Percentages					Mean Score
			0	1	2	3	4	
		%	0	11.82	40.2	35.14	12.84	

Appendix C
Growth Models by Score Type and Rubric Criterion

Focus/Task: IRRC Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.165	0.407	
	Estimated Rate of Change	Std. Error	*z*-value
Coefficients:			
Grade 2	1.402**	0.429	3.271
Grade 3	-0.456	0.399	-1.142
Grade 4	1.156**	0.410	2.823
Grade 5	0.472	0.404	1.169
Grade 6	0.754	0.407	1.853
EL	-0.664***	0.073	-9.078
FRL	-0.434***	0.078	-5.574
Special Ed	-0.778***	0.0976	-7.975
Grade 1: Wave	-0.537***	0.148	-3.620
Grade 2: Wave	-0.408***	0.106	-3.852
Grade 3: Wave	0.975***	0.088	11.117
Grade 4: Wave	0.144	0.092	1.568
Grade 5: Wave	0.628***	0.090	6.944
Grade 6: Wave	0.485***	0.089	5.441

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	*z*-value
1|2	-0.632	0.337	-1.876
2|3	2.103	0.339	6.200
3|4	5.242	0.361	14.506

Focus/Task: Teacher Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.441	0.664	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	0.876*	0.431	2.034
Grade 3	1.568***	0.406	3.864
Grade 4	1.886***	0.414	4.559
Grade 5	1.563***	0.406	3.855
Grade 6	3.080***	0.411	7.487
EL	-0.878***	0.071	-12.405
FRL	-0.563***	0.075	-7.530
Special Ed	-1.071***	0.095	-11.303
Grade 1: Wave	0.581***	0.113	5.160
Grade 2: Wave	0.113	0.101	1.119
Grade 3: Wave	0.038	0.084	0.452
Grade 4: Wave	0.163	0.088	1.848
Grade 5: Wave	0.296***	0.088	3.378
Grade 6: Wave	0.109	0.083	1.323

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	0.071	0.317	0.225
2|3	2.117	0.319	6.627
3|4	4.398	0.325	13.518

Development: IRRC Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.162	0.402	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	3.785***	0.635	5.962
Grade 3	3.332***	0.618	5.390
Grade 4	4.132***	0.622	6.644
Grade 5	3.019***	0.623	4.849
Grade 6	4.441***	0.624	7.120
EL	-0.715***	0.076	-9.386
FRL	-0.379***	0.081	-4.703
Special Ed	-0.904***	0.101	-8.919
Grade 1: Wave	0.115	0.244	0.470
Grade 2: Wave	-0.339**	0.106	-3.195
Grade 3: Wave	0.023	0.087	0.266
Grade 4: Wave	0.245**	0.090	2.721
Grade 5: Wave	0.780***	0.094	8.322
Grade 6: Wave	0.324***	0.090	3.616

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	2.262	0.578	3.913
2|3	5.120	0.581	8.817
3|4	8.463	0.599	14.132

Development: Teacher Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.381	0.617	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	1.044*	0.466	2.241
Grade 3	2.550***	0.433	5.882
Grade 4	3.111***	0.440	7.070
Grade 5	2.365***	0.433	5.457
Grade 6	4.535***	0.438	10.344
EL	-0.868***	0.073	-11.922
FRL	-0.618***	0.077	-8.037
Special Ed	-1.067***	0.097	-11.018
Grade 1: Wave	0.835***	0.131	6.349
Grade 2: Wave	0.605***	0.110	5.509
Grade 3: Wave	0.364***	0.086	4.251
Grade 4: Wave	0.312***	0.089	3.496
Grade 5: Wave	0.634***	0.088	7.202
Grade 6: Wave	0.101	0.084	1.202

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	1.531	0.354	4.322
2|3	3.787	0.358	10.580
3|4	6.184	0.365	16.949

Organization: IRRC Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.133	0.365	
	Estimated Rate of Change	Std. Error	*z*-value
Coefficients:			
Grade 2	2.441**	0.795	3.069
Grade 3	2.291**	0.790	2.898
Grade 4	4.035***	0.784	5.149
Grade 5	3.922***	0.780	5.026
Grade 6	5.394***	0.786	6.860
EL	-0.887***	0.085	-10.419
FRL	-0.590***	0.086	-6.860
Special Ed	-0.876***	0.114	-7.709
Grade 1: Wave	0.027	0.326	0.082
Grade 2: Wave	0.189	0.112	1.683
Grade 3: Wave	-0.111	0.110	-1.004
Grade 4: Wave	-0.267**	0.096	-2.788
Grade 5: Wave	0.326***	0.091	3.572
Grade 6: Wave	-0.597***	0.097	-6.148

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	*z*-value
1|2	2.569	0.747	3.438
2|3	5.799	0.751	7.723
3|4	7.978	0.769	10.369

Organization: Teacher Scores

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.455	0.674	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	0.985	0.517	1.905
Grade 3	2.367***	0.487	4.857
Grade 4	3.059***	0.490	6.245
Grade 5	2.934***	0.482	6.082
Grade 6	4.800***	0.488	9.840
EL	-0.873***	0.076	-11.560
FRL	-0.646***	0.078	-8.236
Special Ed	-1.092***	0.100	-10.868
Grade 1: Wave	0.433**	0.154	2.807
Grade 2: Wave	0.502***	0.112	4.482
Grade 3: Wave	0.184*	0.089	2.055
Grade 4: Wave	0.083	0.090	0.925
Grade 5: Wave	0.270**	0.088	3.064
Grade 6: Wave	-0.191*	0.0841	-2.273

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	1.568	0.408	3.843
2|3	3.864	0.411	9.400
3|4	6.031	0.418	14.425

Language Mechanics: IRRC Scores Grades 1–2

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.700	0.837	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	4.006***	0.718	5.578
EL	-0.842***	0.184	-4.574
FRL	-0.684***	0.182	-3.764
Special Ed	-0.423	0.278	-1.522
Grade 1: Wave	-0.077	0.259	-0.299
Grade 2: Wave	-0.622***	0.110	-5.675

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	2.038	0.638	3.197
2|3	4.229	0.651	6.495
3|4	7.256	0.786	9.231

Language Grammar: IRRC Scores Grades 1–2

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.584	0.764	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	4.074***	0.735	5.540
EL	-0.704***	0.181	-3.892
FRL	-0.527**	0.182	-2.903
Special Ed	-0.317	0.270	-1.175
Grade 1: Wave	-0.101	0.275	-0.367
Grade 2: Wave	-0.556***	0.108	-5.141

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	2.271	0.665	3.413
2|3	4.657	0.679	6.858
3|4	8.279	0.973	8.507

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Language Mechanics: Teacher Scores Grades 1–2

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.457	0.676	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	0.269	0.510	0.526
EL	-1.055***	0.171	-6.177
FRL	-0.866***	0.163	-5.303
Special Ed	-0.340	0.247	-1.374
Grade 1: Wave	0.152	0.152	0.997
Grade 2: Wave	0.572***	0.114	5.006

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	0.927	0.406	2.284
2|3	2.762	0.418	6.611
3|4	5.831	0.604	9.662

Language Grammar: Teacher Scores Grades 1–2

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.535	0.731	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 2	-0.025	0.492	-0.050
EL	-1.059***	0.162	-6.553
FRL	-0.891***	0.158	-5.623
Special Ed	-0.296	0.236	-1.253
Grade 1: Wave	0.468***	0.128	3.643
Grade 2: Wave	0.615***	0.116	5.315

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	0.693	0.369	1.878
2|3	2.789	0.382	7.310
3|4	5.762	0.550	10.473

EVALUATION OF STUDENT WRITING PERFORMANCE IN GRADES 1–6 OF THE MARSHALLTOWN CSD

Language: IRRC Scores Grades 3–6

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.130	0.361	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 4	0.747*	0.320	2.334
Grade 5	-0.465	0.317	-1.467
Grade 6	1.022**	0.315	3.245
EL	-0.964***	0.087	-11.143
FRL	-0.484***	0.091	-5.344
Special Ed	-1.281***	0.113	-11.358
Grade 3: Wave	-0.179*	0.090	-1.988
Grade 4: Wave	0.201*	0.093	2.175
Grade 5: Wave	0.612***	0.093	6.604
Grade 6: Wave	0.414***	0.088	4.682

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	-1.418	0.233	-6.09
2|3	1.404	0.234	6.01
3|4	4.715	0.271	17.40

Language: Teacher Scores Grades 3–6

	Variance	Std. Dev.	
Random effects:			
Classroom (Intercept)	0.327	0.572	
	Estimated Rate of Change	Std. Error	z-value
Coefficients:			
Grade 4	0.240	0.358	0.670
Grade 5	0.647	0.347	1.866
Grade 6	2.067***	0.352	5.864
EL	-0.997***	0.084	-11.871
FRL	-0.609***	0.089	-6.866
Special Ed	-1.562***	0.111	-14.117
Grade 3: Wave	0.342***	0.088	3.907
Grade 4: Wave	0.274**	0.091	3.020
Grade 5: Wave	0.171	0.088	1.947
Grade 6: Wave	-0.010	0.085	-0.121

Note. *** = 0.001; ** = 0.01; * = 0.05

Threshold coefficients:

	Estimate	Std. Error	z-value
1|2	-1.226	0.258	-4.764
2|3	1.017	0.257	3.953
3|4	3.585	0.268	13.394

Appendix D

Prediction Models

IRRC Scores

	Mean	Standard Error	Lower Bound	Upper Bound
Grade 3				
(Intercept)	368.096***	3.684	360.692	375.500
IRRC score	24.578***	1.909	20.741	28.415
EL	-18.055***	2.016	-22.107	-14.003
FRL	-9.503*	3.759	-17.057	-1.950
Special Ed	-11.827***	3.194	-18.245	-5.408
Grade 4				
(Intercept)	393.721***	7.815	378.015	409.426
IRRC score	26.788***	3.446	19.863	33.713
EL	-19.341***	3.435	-26.243	-12.439
FRL	-11.398**	3.664	-18.761	-4.035
Special Ed	-19.121***	4.684	-28.533	-9.710
Grade 5				
(Intercept)	373.352***	11.568	350.105	396.598
IRRC score	33.958***	6.538	20.820	47.096
EL	-15.167**	5.030	-25.274	-5.059
FRL	-14.736**	4.424	-23.626	-5.846
Special Ed	-18.437**	5.573	-29.636	-7.238
Grade 6				
(Intercept)	403.833***	6.682	390.405	417.260
IRRC score	35.991***	2.664	30.638	41.345
EL	-25.630***	4.990	-35.658	-15.601
FRL	-15.809***	3.515	-22.872	-8.746
Special Ed	-18.699**	5.421	-29.593	-7.8067

Note. *** = 0.001; ** = 0.01; * = 0.05

Teacher Scores

	Mean	Standard Error	Lower Bound	Upper Bound
Grade 3				
(Intercept)	376.540***	5.162	366.1661	386.914
Teacher score	15.939***	1.152	13.625	18.254
EL	-19.372***	2.384	-24.163	-14.581
FRL	-6.485	3.748	-14.016	1.046
Special Ed	-12.878**	4.448	-21.816	-3.940
Grade 4				
(Intercept)	414.803***	6.577	401.585	428.020
Teacher score	15.416***	1.981	11.435	19.397
EL	-21.307***	2.719	-26.770	-15.843
FRL	-14.137***	3.494	-21.159	-7.115
Special Ed	-20.913***	4.809	-30.576	-11.250
Grade 5				
(Intercept)	385.489***	8.545	368.318	402.660
Teacher score	27.521***	3.007	21.477	33.564
EL	-17.230**	5.799	-28.883	-5.576
FRL	-8.060*	3.528	-15.151	-0.970
Special Ed	-16.005***	4.211	-24.467	-7.542
Grade 6				
(Intercept)	427.718***	6.131	415.398	440.038
Teacher score	21.521***	1.985	17.532	25.510
EL	-24.108***	5.816	-35.795	-12.422
FRL	-16.951***	4.685	-26.365	-7.537
Special Ed	-16.873**	6.004	-28.938	-4.808

Note. *** = 0.001; ** = 0.01; * = 0.05