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White Paper

Construct Validity in Study Island

Comparing Student Achievement to State Test Performance

Contents

Abstract

This paper examines the evidence for the construct validity of Study Island in two ways. First, we summarize independent research findings that look at the correlation between student performance in Study Island and end-of-year state test scores. Second, using student-level data, we investigate the relationship between Study Island achievement and Florida's end-of-year test scores for students in grades 3 through 8. Across grade levels and subjects, we find high correlations between student performance on Study Island standards mastery and the Florida Comprehensive Assessment Test. These results provide quantitative evidence that Study Island content is aligned to state standards across a variety of states and settings.

Study Island and End-of-Year Achievement

Recent reform efforts in education have focused on creating new standards for students in math and language arts. Students and schools are being held to a higher level as assessments are developed to test student mastery of new standards. Study Island is an online program designed to help students master state academic standards. The program, consisting of practice questions, online lessons, and motivational games, is designed to provide targeted practice to help students master the skills specified in college- and career-ready learning standards and to help schools and districts prepare for the rigorous new web-based exams. During the content development process, Study Island items are expertly aligned to state standards and are designed to closely model the types of items found on the new high-stakes standardized assessments.

Study Island alignment to state standards can be examined with quantitative evidence. High degrees of correlation between Study Island performance and an end-of-year assessment would provide evidence of alignment and additionally show that Study Island can help students prepare for high-stakes assessments and can give teachers an idea of student achievement on the end-of-year assessment.

The purpose of this paper is twofold: First, it examines independent research providing evidence of the alignment of Study Island to state high-stakes standardized assessments. Second, it uses quantitative data to investigate the degree of correspondence between Study Island and a state-standards-based accountability assessment in grades 3 through 8. Specifically, it compares Study Island achievement among students in Florida with the same students' Florida Comprehensive Assessment Test (FCAT) scores to examine the degree of correlation between them. The findings presented in this paper support the close alignment of Study Island to state assessments and validate the use of Study Island to provide appropriate standards mastery practice items and to measure student progress toward end-of-year learning goals.

Independent Research on the Validity of Study Island

This study investigates the construct validity of Study Island. Construct validity pertains to the degree to which the scores from an assessment in a content area correspond to (or converge with) other indicators of student achievement in that same content area. Here, the constructs of interest are the math and English language arts (ELA) state standards, with student mastery of them quantified by both Study Island and state end-of-year assessments. Construct validity is measured by correlating student scores on the two measures of mastery of state standards.

Some recent examples of such research have investigated the relationship between student performance on Study Island and a state-standards-based achievement test. In his 2013 dissertation, Benjamin Bernard examined how mathematics achievement for students on Study Island standards mastery and the Minnesota Comprehensive Assessment (MCA) among 7th and 8th graders in a rural Minnesota district were related. He found that the percentage of Study Island questions answered correctly was strongly correlated to students' MCA scale score.

In addition to Bernard's research in Minnesota, other studies in Michigan and Kansas find similar results. Study Island content is aligned to state standards in each of these states. Dube (2011) finds evidence that 7th-grade math performance on Study Island standards mastery is strongly correlated with performance on the math section of the Michigan Educational Assessment Program. Furthermore, findings from a group of at-risk high school students in Kansas also show high levels of correlation between Study Island performance and both math and reading state assessment performance (Ostroski, 2012). Table 1 summarizes these research findings by reporting the correlation coefficients between student achievement on Study Island and on their states' accountability tests. These correlations provide evidence of the construct validity of Study Island, thus showing the alignment between Study Island and state end-of-year assessment in these three different states.

Table 1. Correlation Coefficients for Student Performance on Study Island and State Assessments

	7th Grade Math	8th Grade Math	10th Grade Math	11th Grade Reading
Bernard, 2013 (Minnesota)	0.73	0.55		
Dube, 2011 (Michigan)	0.69			
Ostroski, 2012 (Kansas)			0.82	0.83

Although these studies provide evidence that Study Island performance is correlated with student achievement on state accountability assessments, each study was limited in its scope. These studies focused on small schools and districts and among specific student populations and grades. This paper adds to the evidence indicating the construct validity of Study Island by looking at the correlation between both math and ELA Study Island performance and state accountability assessment performance in multiple Florida schools among students in grades 3 through 8. The next section discusses the research context and the methodology used to investigate the research questions.

A Correlational Study of Study Island

This study examines the validity of Study Island standards mastery math and reading products in 16 schools in Florida. In this context, validity—specifically, construct validity—quantifies the degree of correspondence between two separate indicators of student achievement that are designed to measure student ability in a given content area. A high degree of correlation suggests that the content of the two measures of achievement is closely aligned. In this paper, we look at the correlation between student performance on the math and ELA Study Island standards mastery products and the FCAT. The FCAT is Florida's standards-based accountability assessment and tests student mastery of Florida state standards. It is administered to students in grades 3 through 8, with some additional grades tested in high school.

Research Context

Data are taken from elementary and middle public schools in Florida that used Study Island standards mastery products during the 2013–14 school year. Table 2 provides several school-level characteristics and shows the variety of school types that are included. Overall, these schools tend to enroll large proportions of children eligible for free or reduced price lunches and large proportions of minority students. Most of the schools are located in either urban or suburban neighborhoods, with enrollment ranging from 177 to 960 students. The Florida Department of Education uses student achievement, student learning gains, and progress of the lower quartile of students on state assessments (the FCAT) and end-of-course assessments to give each school a grade. These grades, which are reported in Table 2, range from A to F, showing the wide achievement differences between schools.

Table 2. Sample School Characteristics

School	Grades Enrolled	Location	Enrollment Count	% Minority	% Free or Reduced Lunch	Florida Dept. of Education Grade, 2014
1	PK–5	urban	375	36	40	A
2	PK–5	urban	403	56	72	C
3	PK–5	suburban	800	55	51	A
4	PK–5	suburban	800	84	90	A
5	PK–5	suburban	751	73	94	C
6	PK–5	suburban	557	47	56	A
7	PK–5	suburban	632	54	63	C
8	PK–5	rural	812	39	26	A
9	PK–5	suburban	468	90	94	C
10	K–5	urban	177	74	86	D
11	K–5	suburban	429	19	31	C
12	6–8	urban	172	75	79	A
13	6–8	suburban	191	17	41	A
14	6–8	urban	730	96	96	F
15	6–8	suburban	960	59	80	C
16	6–8	suburban	891	87	91	C
	Averages		572	63	70	

Data Sources: Florida Department of Education; MDR School Data

Data and Methods

The purpose of this study is to examine how two measures of student mastery of Florida state standards—student performance on Study Island and on the FCAT—are related to each other. Students used Study Island over the course of the entire school year, while the FCAT exam was administered between April 22 and May 7, 2014. Individual FCAT scores for the students were matched with their percentage correct in both math and ELA on Study Island to investigate the relationship between the two.

Schools typically use Study Island throughout the school year to supplement teacher instruction. Here, student performance on Study Island is measured by the percentage of Study Island questions answered correctly in math and ELA, separately, during the school year. Students who answered fewer than 125 Study Island questions were eliminated from inclusion in this study. This ensures that students included in the study have had at least moderate exposure to Study Island and can be considered to be true users. Students with fewer than 125 questions typically have sporadic usage, with small amounts of time spent working on Study Island over the course of the school year. In total, the number of students in the math sample is 1,196, and the number of students in the ELA sample is 1,915. Student FCAT scores, the developmental scale scores reported by the Florida Department of Education, range from 140 to 298 across grades 3 through 8.

Data Analysis

To examine the degree of correlation between student Study Island and FCAT performance, correlation coefficients were calculated for students by grade. Table 3 shows that the degree of correlation for math between student performance on Study Island and the FCAT is moderately high, ranging from 0.574 in 5th grade to 0.738 in 3rd grade. These findings mirror the magnitude of the correlation coefficients found by outside researchers that are reported earlier in the paper.

Table 3. Math Correlation Coefficients Between Student Performance on Study Island and FCAT

Grade	Number of Students	Correlation Coefficient
3	320	0.738
4	265	0.619
5	225	0.574
6	142	0.658
7	116	0.640
8	128	0.685

The scatterplot in Figure 1 shows the relationship between a student's percentage of correct math Study Island answers and the student's math FCAT score. The line of best fit shows that Study Island performance and math FCAT achievement are positively correlated. Thus, students who have higher achievement on math Study Island are also likely to have higher math FCAT scores.

Figure 1. Relationship Between Percentage of Math Study Island Items Correct and Math FCAT Score: Florida Schools, 2013–14 School Year

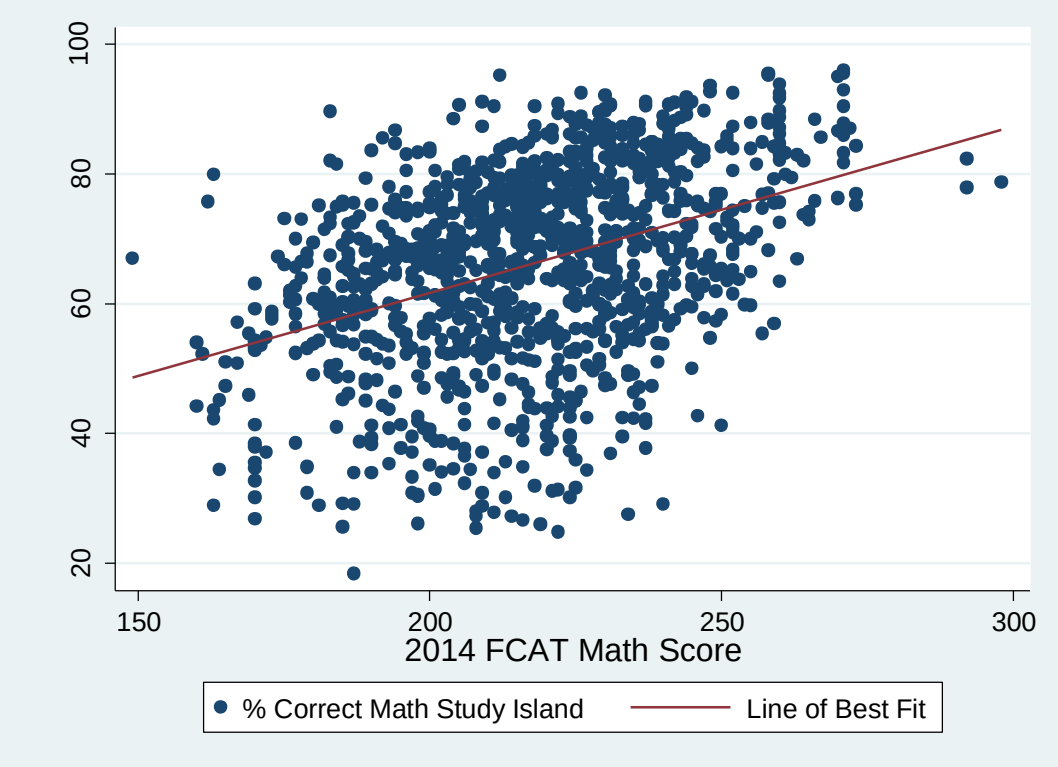


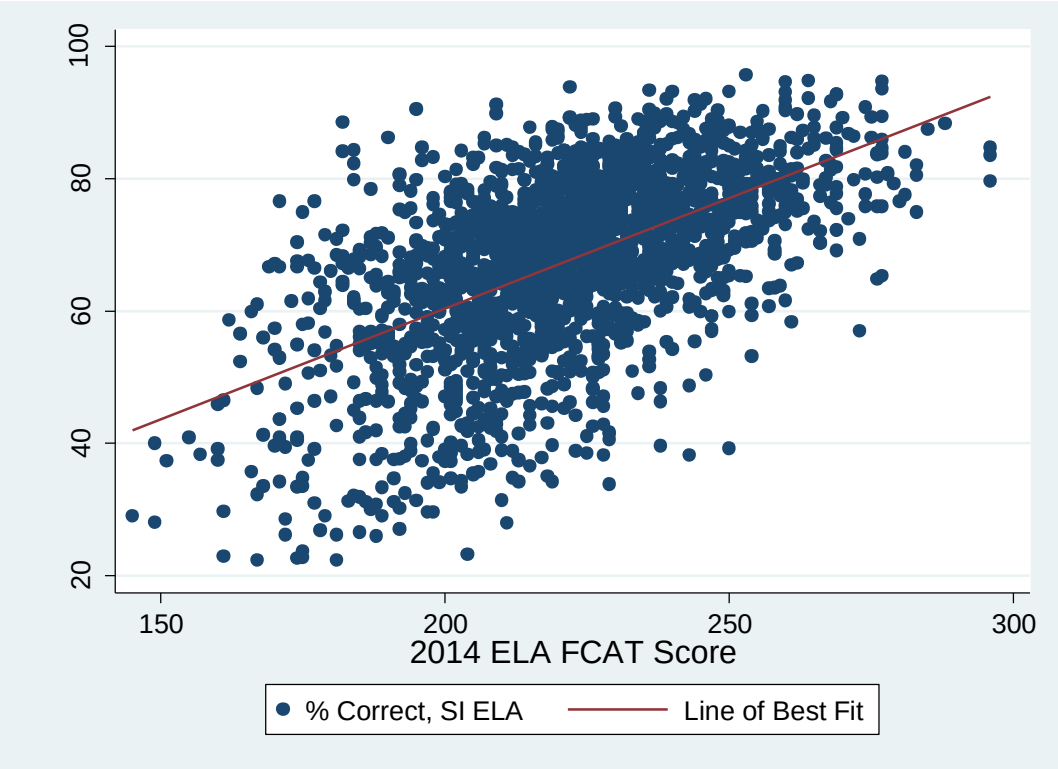
Table 4 shows that the degree of correlation between student performance on ELA Study Island and the ELA FCAT is also moderately high, ranging from 0.638 in 7th grade to 0.745 in 8th grade.

Table 4. ELA Correlation Coefficients Between Student Performance on Study Island and FCAT

Grade	Number of Students	Correlation Coefficient
3	331	0.694
4	307	0.646
5	443	0.651
6	296	0.653
7	376	0.638
8	162	0.745

The scatterplot in Figure 2 shows the relationship between a student's percentage of correct ELA Study Island answers and the student's ELA FCAT score. The line of best fit shows that student ELA Study Island performance and ELA FCAT achievement are positively correlated. Thus, students who have higher achievement on Study Island in ELA are also likely to have higher ELA FCAT scores.

Figure 2. Relationship Between Percentage of ELA Study Island Items Correct and ELA FCAT Score, Florida Schools, 2013–14 School Year



Conclusion

In this paper, we find strong evidence for the construct validity of Study Island. The high correlations between Study Island and end-of-year test scores for students in grades 3 through 8 and across both math and ELA subject areas in this study and other independent research show the alignment of Study Island with state assessments. The evidence presented here supports the use of Study Island both to help students prepare for high-stakes assessments and as a formative assessment tool to measure student progress toward end-of-year achievement. With Study Island, students and teachers can be prepared for increased rigor and high levels of achievement.

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