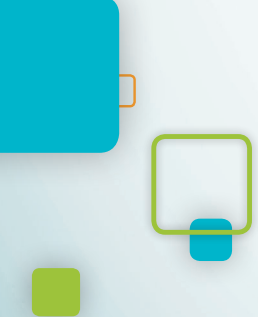
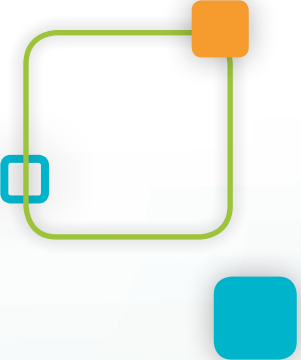




*i-Ready Efficacy:*  
**Research on *i-Ready*  
Program Impact**

.....  
*Research Support for i-Ready and ESSA*  
.....





## **The Impact of *i-Ready***

In fall of 2017 Curriculum Associates conducted comprehensive research into the impact of *i-Ready Instruction* on student learning gains as measured by the *i-Ready Diagnostic*. Using *i-Ready Diagnostic* data from over four million students who took the *i-Ready Diagnostic* in the 2016–2017 academic year, our research team found that students using *i-Ready Instruction* experienced greater learning gains than students who did not use the program.

Learning gains for those students receiving *i-Ready Instruction* were substantial. Students receiving *i-Ready Instruction* experienced average gains of 39% for English language arts (ELA) and 38% for mathematics relative to students who did not receive *i-Ready Instruction* across grades K–8. Measured effect sizes were generally strong by the standards of an educational intervention (Cohen’s *d* of greater than .25).

An additional analysis was performed to control for selection bias for grades 1–8. Again, the research found that students receiving *i-Ready Instruction* showed greater learning gains than students who did not receive *i-Ready Instruction*. All results were statistically significant at the  $p < .05$  level across all subjects and grades, and nearly all results were significant at the  $p < .0001$  level.

Our research also evaluated the impact for subgroups and found similar results, with non-Caucasian students, students with disabilities, economically disadvantaged students, and English language learners overall demonstrating greater gains and exhibiting stronger effects than students in these subgroups who did not receive *i-Ready Instruction*.

These results indicate that *i-Ready Instruction* is an effective intervention and an effective system for accelerating student growth and progress toward proficiency. Furthermore, because this study yielded favorable results controlling for selection bias for grades 1–8, the research provides evidence that *i-Ready Instruction* meets the criteria for the Every Student Succeeds Act (or ESSA) Level 3: Promising Evidence, with favorable effects.

### ***i-Ready Instruction* as Treatment**

For the purposes of the research in this report, a student was defined as having received *i-Ready Instruction* if the student:

- Completed the *i-Ready Diagnostic* at both the beginning and the end of the academic year.
- Received *i-Ready Instruction* for at least 18 weeks of the academic year.
- Received an average of 45 minutes of *i-Ready Instruction* per subject per week.

These criteria for inclusion are consistent with guidance provided to educators as they implement the *i-Ready* program in their schools and districts.

### ***i-Ready* Control Group**

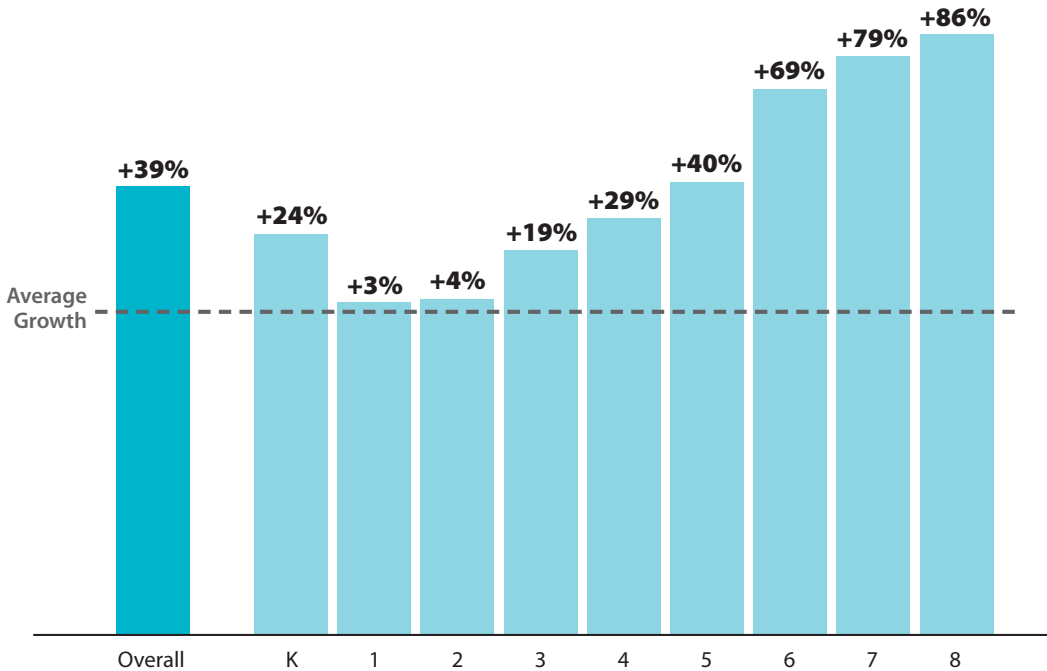
For the purposes of the research in this report, a student was defined as not having received *i-Ready Instruction* if the student:

- Completed the *i-Ready Diagnostic* at the beginning and the end of the academic year.
- Did not receive *i-Ready Instruction*.

## Students Receiving *i-Ready Instruction* Experienced Greater Gains

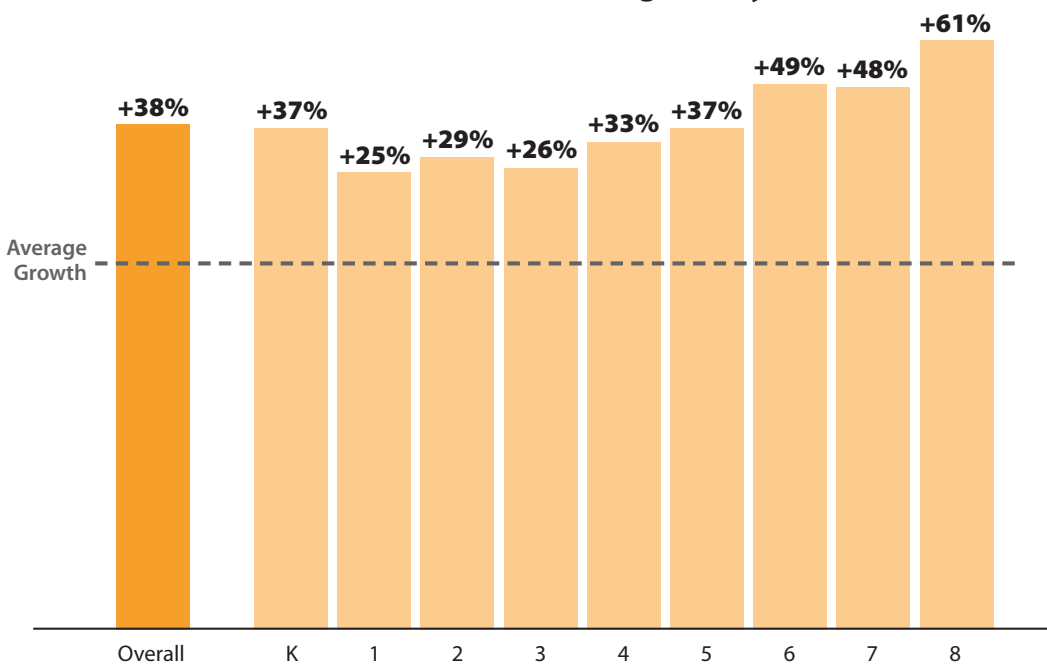
In both ELA and mathematics, students receiving *i-Ready Instruction* experienced, on average, greater score gains than students who did not receive *i-Ready Instruction*, meaning those students who received instruction grew more than those who did not.

### ELA Score Gains for Students Receiving *i-Ready Instruction* Relative to Students Not Receiving *i-Ready Instruction*



In ELA, students receiving *i-Ready Instruction* experienced score gains 39% greater than those not receiving *i-Ready Instruction*. Across all grades, students receiving *i-Ready Instruction* experienced score gains 3% to 86% greater than those who did not receive *i-Ready Instruction*.

### Mathematics Score Gains for Students Receiving *i-Ready Instruction* Relative to Students Not Receiving *i-Ready Instruction*



In mathematics, students receiving *i-Ready Instruction* experienced score gains 38% greater than those not receiving *i-Ready Instruction*. Across all grades, students receiving *i-Ready Instruction* experienced score gains 25% to 61% greater than those who did not receive *i-Ready Instruction*.

## Effect Sizes

In general, students who received *i-Ready Instruction* during the 2016–2017 school year experienced greater learning gains than students who did not receive *i-Ready Instruction*. Overall, the effect sizes from the research meet or exceed the standard for “large” with an overall effect size of .36 in ELA and an overall effect size of .43 in mathematics. *Please see the explanation below for more information about effect sizes.*

The standard for a large effect size is met for kindergarten in ELA; in mathematics, the standard is met for every grade.

### Effect Sizes for Differences in Means Using Cohen’s *d* by Grade (ELA)

Effect Size	Overall	K	1	2	3	4	5	6	7	8
Cohen’s <i>d</i>	.36*	.36*	.05	.06	.17	.19	.20	.21	.19	.18

### Effect Sizes for Differences in Means Using Cohen’s *d* by Grade (Mathematics)

Effect Size	Overall	K	1	2	3	4	5	6	7	8
Cohen’s <i>d</i>	.43*	.52*	.41*	.44*	.39*	.41*	.35*	.34*	.25*	.27*

\*Effect size met or exceeded Lipsey’s (2012) criteria for being considered “large.”

#### ***Effect Sizes in Education Research***

Effect sizes are a common way of measuring the strength of an educational intervention. While there are many ways to quantify effect sizes, Cohen’s *d* is a widely used method for quantifying the differences in the means or averages between two groups, measured in standard deviations. Larger effect sizes indicate a greater effect. Because the outcomes are more challenging to influence with interventions, the average effect sizes in research fields such as education, medicine, and economics are smaller than in other fields of research. Specifically, interventions in education research with an effect size of .25 or greater are considered “large” (Lipsey et al., 2012).

## ***i-Ready* and ESSA**

ESSA defines four categories of research evidence for an effective intervention. Under ESSA, a promising intervention should be supported by at least one correlational study that controls for selection bias. Hence, another goal of the research was to understand the impact of *i-Ready Instruction*, while controlling for selection bias, and validate that *i-Ready* meets the Level 3 ESSA criteria.

To examine the significance of the findings, the Curriculum Associates research team conducted an ANCOVA analysis and corrected for selection bias using students' prior *i-Ready Diagnostic* scores. Researchers studied *i-Ready* data from the 2016–2017 school year, but limited the data to only those students who had *i-Ready Diagnostic* scores from the prior academic year, which excluded kindergarteners from the analysis. Using the resulting sample of over 270,000 ELA students and over 250,000 mathematics students, the research showed that under statistical controls for prior test scores, students receiving *i-Ready Instruction* demonstrated greater gains on the spring *i-Ready Diagnostic* than students who did not receive *i-Ready Instruction*.

The results of this study were statistically significant at the  $p < .05$  level for all grades and subjects, and all but one of the results—grade 2 ELA—were significant at the  $p < .0001$  level. Based on the results of this analysis, *i-Ready Instruction* shows evidence of promoting greater student learning gains. The significance of the findings provides support for *i-Ready* as a program that meets the criteria for ESSA Level 3: Promising Evidence.

### ***i-Ready* Correlation with Controls Results by Grade (ELA)**

Control	Overall	1	2	3	4	5	6	7	8
<i>F</i> Statistic	$F(1,273674)$ =2515.56	$F(1,26983)$ =105.19	$F(1,34421)$ =6.45	$F(1,38839)$ =150.19	$F(1,40569)$ =296.22	$F(1,41129)$ =371.19	$F(1,27624)$ =220.54	$F(1,30108)$ =94.85	$F(1,31424)$ =56.40
<i>p</i> -value	$p < .0001$	$p < .0001$	$p = .01$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$

### ***i-Ready* Correlation with Controls Results by Grade (Mathematics)**

Control	Overall	1	2	3	4	5	6	7	8
<i>F</i> Statistic	$F(1,252040)$ =9131.96	$F(1,19913)$ =720.15	$F(1,28567)$ =1153.19	$F(1,33139)$ =1122.66	$F(1,38767)$ =1186.61	$F(1,39110)$ =986.68	$F(1,29130)$ =690.71	$F(1,31040)$ =181.29	$F(1,30547)$ =234.65
<i>p</i> -value	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$

#### ***Understanding p-values***

*p*-values help support interpretation of the significance of a research result. Here *p*-values indicate the probability that the differences in average score gains between students receiving *i-Ready Instruction* and not receiving *i-Ready Instruction* were due to chance. A *p*-value of less than .0001 can also be understood as a .01% chance or a 1 in 10,000 chance.

## Sample Sizes

The following tables show the samples sizes of students included in the ANCOVA analysis. The sample sizes for this analysis are smaller than the sample size of the overall effect analysis presented earlier, and exclude kindergarten. This is because only students who had a prior *i-Ready Diagnostic* score from spring of their prior year were included in the analysis. Adding the condition of prior-score availability also ensures that students included in this analysis are from a more mature implementation of the *i-Ready* program.

### Number of Students Included in ANCOVA Analysis Receiving and Not Receiving *i-Ready* Instruction by Grade (ELA)

ELA	Overall	1	2	3	4	5	6	7	8
No Instruction	187,790	13,120	17,752	23,439	26,944	29,176	22,511	26,174	28,674
Received Instruction	86,404	14,183	17,016	15,761	14,020	12,367	5,514	4,354	3,189

### Number of Students Included in ANCOVA Analysis Receiving and Not Receiving *i-Ready* Instruction by Grade (Mathematics)

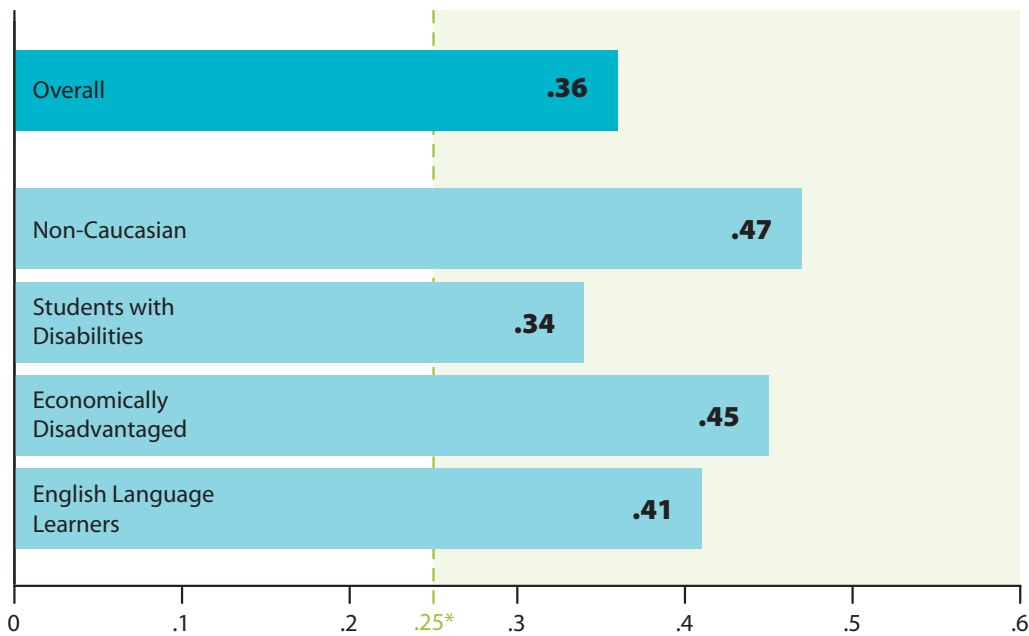
Mathematics	Overall	1	2	3	4	5	6	7	8
No Instruction	179,518	12,951	18,869	20,657	26,132	26,732	22,777	25,391	26,009
Received Instruction	72,905	7,213	9,957	12,757	12,899	12,667	6,631	5,943	4,838

## Subgroup Analysis

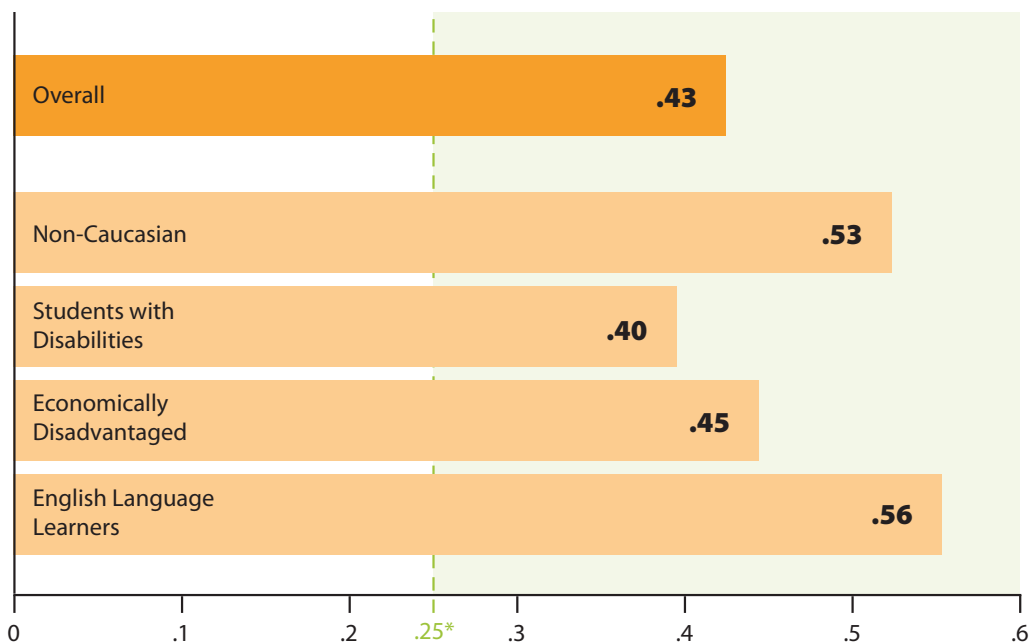
The *i-Ready* study data was also analyzed by using four subgroups: non-Caucasian students, students with disabilities, economically disadvantaged students, and English language learners. Overall, the students in these subgroups receiving *i-Ready Instruction* experienced greater learning gains than students in the same subgroup who did not receive *i-Ready Instruction*. This indicates that in general, *i-Ready Instruction* can enhance learning gains for students in these subgroups.

Due to sample limitations, the ANCOVA analyses were not performed for the subgroup analysis. These analyses will be performed and expanded upon in future research.

### ELA Effect Sizes Overall and by Subgroup



### Mathematics Effect Sizes Overall and by Subgroup



\*Interventions in education research with an effect size of .25 and greater are considered "large." See note on p. 5.



## Samples Sizes for These Analyses

Samples for the subgroup analyses were based on assessment data collected through the *i-Ready Diagnostic* and student demographic data collected from participating schools and districts. Study sample sizes for the subgroup analysis are smaller than the sample size of the overall analysis due to differences in available demographic and categorical data.

### Number of Students Receiving and Not Receiving *i-Ready Instruction* by Grade (ELA)\*

Subgroup	K	1	2	3	4	5	6	7	8
<b>Overall</b>									
No Instruction	36,184	44,999	48,824	54,270	61,178	63,457	60,521	61,982	64,514
Received Instruction	19,941	31,310	34,365	34,902	27,186	24,216	12,885	8,638	6,594
<b>Non-Caucasian</b>									
No Instruction	6,978	7,545	7,763	9,581	13,175	14,190	13,442	15,078	16,069
Received Instruction	10,536	14,635	16,277	16,528	13,470	11,776	4,219	2,986	2,350
<b>Students with Disabilities</b>									
No Instruction	1,336	1,844	2,153	2,597	3,524	4,039	3,517	3,635	3,659
Received Instruction	1,359	1,724	2,143	2,945	1,992	1,777	635	433	312
<b>Economically Disadvantaged</b>									
No Instruction	1,726	2,759	3,226	3,901	6,232	7,082	5,917	6,509	7,054
Received Instruction	2,422	4,401	5,039	5,485	3,900	3,480	1,350	756	566
<b>English Language Learners</b>									
No Instruction	2,565	2,227	2,391	2,421	2,825	2,806	2,291	2,545	2,248
Received Instruction	2,570	4,124	5,541	5,121	2,844	2,522	640	430	348

### Number of Students Receiving and Not Receiving *i-Ready Instruction* by Grade (Mathematics)\*

Subgroup	K	1	2	3	4	5	6	7	8
<b>Overall</b>									
No Instruction	34,528	50,739	55,139	57,187	60,581	63,272	60,282	60,212	61,042
Received Instruction	9,251	15,887	21,028	26,864	25,748	24,147	15,918	11,604	9,314
<b>Non-Caucasian</b>									
No Instruction	9,019	12,416	13,767	14,951	16,343	17,031	15,102	16,030	16,390
Received Instruction	4,545	6,989	9,062	11,596	10,823	9,808	4,969	3,894	3,310
<b>Students with Disabilities</b>									
No Instruction	1,320	2,199	2,670	3,378	3,800	3,972	3,347	3,240	3,250
Received Instruction	626	845	1,237	1,803	1,666	1,648	775	621	499
<b>Economically Disadvantaged</b>									
No Instruction	3,213	4,908	6,335	7,300	8,195	8,484	6,250	6,980	7,304
Received Instruction	526	1,627	2,791	3,754	3,516	3,367	1,627	1,038	964
<b>English Language Learners</b>									
No Instruction	2,968	3,295	3,979	4,207	3,434	3,464	2,489	2,518	2,349
Received Instruction	1,125	1,924	3,041	3,789	2,506	2,071	769	595	567

\*Providing demographic data to Curriculum Associates is optional for educators, so the number of students listed in the rows for "Non-Caucasian," "Students with Disabilities," "Economically Disadvantaged," and "English Language Learners" does not add up to the number of students listed under "Overall."

## Findings from the Research

The research was undertaken with the goal of answering two key research questions:

- How does annual score growth for students receiving *i-Ready Instruction* compare to students who did not receive *i-Ready Instruction*?
- Are the differences in score growth statistically significant, after controlling for selection bias?

Curriculum Associates' research team conducted two analyses to answer the above questions. In the first analysis, descriptive statistics and effect sizes were analyzed. Mean score gains were calculated for the treatment (students receiving *i-Ready Instruction*) and control groups (students who did not receive *i-Ready Instruction*) and were then compared. To show the magnitude of the differences, the Cohen's *d* effect size using the pooled standard deviation of the groups was calculated for each grade. A subgroup analysis was also performed, and Cohen's *d* effect sizes were also calculated for the following subgroups of students: non-Caucasian students, students with disabilities, economically disadvantaged students, and English language learners.

The second analysis involved evaluating the score gains controlling for selection bias, as assignment to the treatment and control groups was nonrandom. An ANCOVA analysis was performed for each grade (1–8) and subject (ELA and mathematics) to examine the effect of *i-Ready Instruction* on student score gains. Prior test scores (i.e., *i-Ready Diagnostic* spring scores from the prior year) were included as the covariate to control for selection bias. Since kindergarten students do not have a prior spring test score, those students were removed from the analysis. Results are considered statistically significant by What Works Clearinghouse if the *p*-value is less than five percent ( $p < .05$ ). All calculated *p*-values for this analysis were significant at the  $p < .05$  level for all grades and subjects, and were significant for nearly all grades and subjects at the  $p < .0001$  level.

### Findings from these analyses support positive answers to both research questions:

Students receiving *i-Ready Instruction* showed greater learning gains than students who did not. Effect sizes across subjects and grades were positive and generally strong. These effects were also observed for subgroups.

The differences in student score growth at grades 1–8 were statistically significant after controlling for selection bias.

## About the *i-Ready* Program

Curriculum Associates' *i-Ready Assessments* and *i-Ready Instruction* combine valid and reliable assessments with sophisticated instructional resources targeted to each student's specific academic needs. The program also provides a system of comprehensive, actionable reports to guide decision-making at the student, class, school, and district levels.

*i-Ready* is designed to accelerate student growth and ultimately help students reach proficiency. The *i-Ready Diagnostic* uses advanced technology to provide a detailed, customized evaluation of every student and to track student growth and performance consistently and continuously over a student's K–8 experience. By dynamically adapting based on student response patterns, adaptive assessments are able to derive large amounts of information from a limited number of test items. This allows the *i-Ready Diagnostic* to more accurately and more efficiently pinpoint students' needs than traditional fixed-form tests. Instantly available reports based on diagnostic results help teachers better understand their students' individual needs and adjust instruction accordingly.

Based on the results of *i-Ready Diagnostic*, students are automatically placed into personalized learning paths customized to their *i-Ready* placement levels. *i-Ready Instruction* builds a unique lesson plan consisting of online instructional lessons based on assessment performance, with a personalized starting point for every student. These online lessons are designed to build conceptual understanding while engaging learners of all levels. They follow a natural developmental progression: skills that students learn in earlier lessons build the foundation for later lessons. Throughout *i-Ready Instruction*, students receive immediate corrective feedback that is specific and purposeful.

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### References

Lipsey, M.W., Puzio, K., Yun, C., Hebert, M.A., Steinka-Fry, K., Cole, M.W., et al. (2012). Translating the Statistical Representation of the Effects of Education Interventions into More Readily Interpretable Forms. (NCSE 2013-3000). Washington, DC: National Center for Special Education Research, Institute of Education Sciences, U.S. Department of Education. This report is available on the IES website at <http://ies.ed.gov/ncser/>.



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