

Literacy Courseware Challenge Evaluation

Results of ThinkCERCA (ThinkCERCA)
Participation

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SRI Education™

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Introduction

ThinkCERCA implemented its product, ThinkCERCA, during pilot waves 1 and 2 of the study, January 2014 through June 2014 (Spring semester of the 2013-2014 academic year) and September 2014 through December 2014 (Fall semester of the 2014-2015 academic year). Table 1 summarizes the overall number of districts, schools, teachers, and students that were included in the research.

Table 1. Number of Participants Using the Product Included in the Research

	Number of Research Participants
Districts	2
Schools	2 elementary
Teachers	5 elementary
Students*	131
Grade 4	99
Grade 5	32

* The students included in the research were those students for which the research team was able to collect both a pretest and posttest writing assessment so that gains in writing skills during the pilot period could be assessed. This sample represents approximately 24% of all students who used the product based on estimates from class rosters. Two other districts with additional teachers and students participated in the piloting, but not in the research.

Description of the Participating School Districts

Rocketship BayArea Charters (RS)

Rocketship Bay Area is a regional charter organization under the umbrella of a national charter organization in the Bay Area are located in a large, urban area comprised predominantly of high-tech industry and related industry. Comprised of 10 schools, there are approximately 6,000 students in grades TK-5th. Of those students, 90% are eligible for free/reduced lunch, and 75% are ELL. As the network spans across a wide swath of the urban area, the student population in the two schools is slightly different from each other and the organization as a whole - one is comprised of approximately 85% Latino, 2% African-American, 2% Asian, 3% white and the other is approximately 75% Latino, 1% African-American, 21% Asian, and 3% other.

Henry County Schools (HC)

This school district is the seventh largest public school district in Georgia with 50 schools serving over 20,000 students. Of those students, only 2% are English Language Learners and 52% are considered economically disadvantaged. The demographic breakdown of the population is 48% are African-American, 37% White, 8% Hispanic, 4% multi-racial and 3% Asian.

Usage of the ThinkCERCA Product

Results from Use Logs

ThinkCERCA provided system use log files that averaged the amount of time students used the ThinkCERCA product. The implementation of ThinkCERCA took place during two waves with approximately 18 weeks in an academic semester and approximately 90 hours of available instructional time in English Language Arts (assumes that ELA is taught daily for 1 hour per day) in each period. Table 2 shows the usage statistics for each school in the ThinkCERCA sample.

It should be noted that the average number of minutes provided by the ThinkCERCA system yielded information that could be aggregated by school for only one of the districts. It appears that on average ThinkCERCA was used in just over half of the weeks in the semester and represents about 31% of the total available instructional time.

Table 2. Product Usage Reported based on the System Log Files by District and School

District-School	Grade Level	Number of Students	# Weeks Used	Avg Days Per Week	Total Minutes (Hrs)
					1662.2
DV1	5	89	14	3.8	(27.7)
HC1	4	111	6.3	NC	NC
Average			10.2	NC	NC

(NC = not able to calculate)

Results from Teacher Survey

A teachers survey was administered at the end of each pilot wave. The survey was administered online. The survey asked questions about the teachers' experience using the products in their classrooms, how often, for what purpose, benefits to their instruction and students, and any challenges faced that impacted their use of the product. Of the 12 teachers that piloted ThinkCERCA, a completed survey was collected from 9 of them. Four of the teachers who completed a survey were in 2 of the districts that did not provide pre-post student writing samples. A summary of the survey results is provided below.

Adequacy of training. Teachers' reports of whether they were adequately prepared to use the product effectively was strongly positive. Seven of 9 teachers reported they were "moderately" prepared, 1 indicated that she was "very well" prepared, while 1 other reported she was "not very" prepared.

Weekly use. Nearly 90% of the teachers reported using the product two (n = 6) or three (n = 2) days per week in their classrooms. One teacher reported using it only twice during the semester due to lack of access to computers.

Minutes per session. The results of this survey item varied greatly with no majority selecting an instructional timeframe. One teacher reported using the product for about 25 minutes a session, two reported 45 minutes, one 50 minutes, the rest reported using the product for 60 (n = 2), 65 (n = 1) or 70 minutes (n = 1) per usage..

Use for enrichment and remediation: A strong majority of teachers (89%) reported they used the product “somewhat” (n = 5) to “a lot” (n = 3) to provide enrichment activities for both their advanced students as well as to support struggling learners.

Main instructional focus of the product. Most of the teachers (78%, n = 7) reported that ThinkCERCA was a product that supported both writing and reading instruction.

Writing tasks supported by product. Teachers reported using ThinkCERCA to support a variety of writing tasks. All of the teachers (n = 9) reported using the product to support writing activities requiring short-response answers. Eight teachers reported using the product to support extended writing assignments of 3 or more paragraphs.

Student engagement while on product. A strong majority of teachers reported that students were either “moderately” (n = 2) or “highly” engaged (n = 6) when working with the product. Only one teacher indicated that her students were “slightly” engaged.

Benefits to instruction. One-half or more of teachers who provided a response agreed (“agree” or “strongly agree”) that the use of the product:

- leads teachers to assign more writing assignments (8 of 9);
- provided students with more immediate feedback than otherwise would have been possible (6 of 9);
- made it possible for them to differentiate assignments for students with different abilities (7 of 9);
- and allowed them to spend more time supporting the needs of individual students (7 of 9).

Benefits to students. Teachers believed the use of ThinkCERCA benefited students writing and reading skills almost evenly.

- 6 of 9 teachers reported that they “agreed” (n = 3) or “strongly agreed” (n = 3) that students’ writing skills improved, they were more engaged as writers and gained more confidence as writers resulting from use of the product.
- Similarly, 7 of 9 teachers agreed that students reading skills improved, while 5 of 9 reported students gained more confidence with reading tasks (“agreed” n = 4; “strongly agreed” n = 1) as a result of using the product.

Impact of training and product design on use.

- The majority of teachers reported that the insufficient training had “no impact” (n = 5) on their use; three teachers reported a “small impact”.
- Only 1 teacher reported that a lack of alignment between the product and the schools’ curriculum or teacher practice had a “moderate” negative impact on their ability to use the product effectively.

Overall satisfaction with product. A strong majority of teachers reported they were satisfied with the use of the product in their classrooms.

- 8 of 9 teachers reported they were either “somewhat” (n = 2) or “extremely” satisfied (n = 6) with the product.
- 7 teachers reported they would definitely use the product again in their instruction, while 1 teachers reported “maybe” and one reported “probably not”.
- 6 of 9 teachers also reported they would “definitely” recommend the use of the product to another teacher, while two others reported “maybe”. Only one teacher reported that she would “probably not” recommend ThinkCERCA to one of their peers.

Gains in Student Writing Scores

This next section describes the gains made in writing skills for students in classrooms that piloted ThinkCERCA for each of the 6 aspects of student writing measured by the study’s writing assessment. The distributions are shown for all students that provide a writing sample for both a pretest and posttest writing assessment (approximately 24% of all students who participated in a ThinkCERCA pilot).

SRI developed 4 opinion/argumentative and 4 informative writing assessments, 2 each for elementary grades (3-5) and middle school grade (6-8). The assessments were reviewed by an ELA expert contracted by SRI with expertise in writing instruction and student literacy in the elementary grade levels and schools serving students from low-income communities. SRI then refined the assessments based on feedback from the ELA expert and piloted the online assessments in two schools and two classrooms in each school (one 4th grade and one 6th grade) serving low-income students. SRI then revised the assessments based on information collected during the pilot administrations. Students in elementary grades (4-5) or middle school grades (6-8) were randomly assigned 1 of 4 eligible prompts as a pretest and the other prompt in the matched pair as the posttest. A text version of the writing prompts are included in Appendix A.

Each response was scored on 6 different writing aspects: Introduction, Conclusion, Relevance and Significance, Coherence and Sequencing, Language and Word Choice, and Written Conventions. The aspects were scored on a range of 0 to 4, with 0 indicating a lack of the aspect, too few words to score or copied and pasted material. A score of score of 4 indicates the writing showed strong evidence that all standards for an aspect were met. An automated scoring engine developed by SRI and trained and validated using scoring data produced by human scoring scored all responses. Additional details about the scoring process are included in Appendix B along with the associated

scoring rubrics.

Table 3 shows the number of writing assessment collected on ThinkCERCA student participants by grade level during the course of the study. All students who were pretested were not necessarily post-tested. Of the 251 elementary student pretested, 131 were also post-tested or 52%. Note that the results for elementary grade levels are associated with students taught by 5 different teachers in 2 schools. In the next section we describe the how the gains in student writing scores were distributed across the 6 writing aspects.

Table 3. Number of Writing Assessments Collected by Grade Level

	Pretest N	Posttest N	Pretest and Posttest
Elementary School	251	232	131
Total	251	232	131

Distribution of Gains in Writing Scores by Writing Aspect

The next series of tables and figures show how the gain scores were distributed across the 6 different writing aspects for students using ThinkCERCA in the elementary grades (Grade 4-5; Table 4 and Figure 1). Whether the average gain scores were statistically different from 0 is also indicated (average gain greater or less than 0 from the pre- and posttest). (The results of an additional analysis that shows how the gain scores were distributed across teachers within district are included in Appendix C).

Gains in student writing scores in the elementary grades were positive across all writing aspects and statistically significant for 5 of the 6 aspects but one – Language and Word Choice (Table 4 and Figure 1).

Care must be taken in the interpretation of the results of the analysis of gains in pilot classrooms. The results should not be used to make claims about the effectiveness of ThinkCERCA alone. On average, the time between the administration of the pretest and posttest writing represented approximately 8 to 12 weeks of product use. During this time, in addition to the use of ThinkCERCA, students were also receiving direct instruction in reading, writing, and other aspects of English language arts as well as opportunities to develop their writing skills across other subject areas. Both of these instructional opportunities, along with the use of the ThinkCERCA, may have also contributed to the gains in writing skills that were measured. In other words, because the gain analysis includes only those students who used ThinkCERCA, there is no way to know whether the gains measured reflect the use of ThinkCERCA or just typical gains for the average student in these schools. In the next section, we present results of an analysis of writing scores that attempt to

establish stronger evidence of the possible effectiveness of ThinkCERCA at improving writing skills by comparing gains in writing scores for students in classrooms piloting ThinkCERCA to students in “business as usual” comparison classrooms where no online writing tools were used.

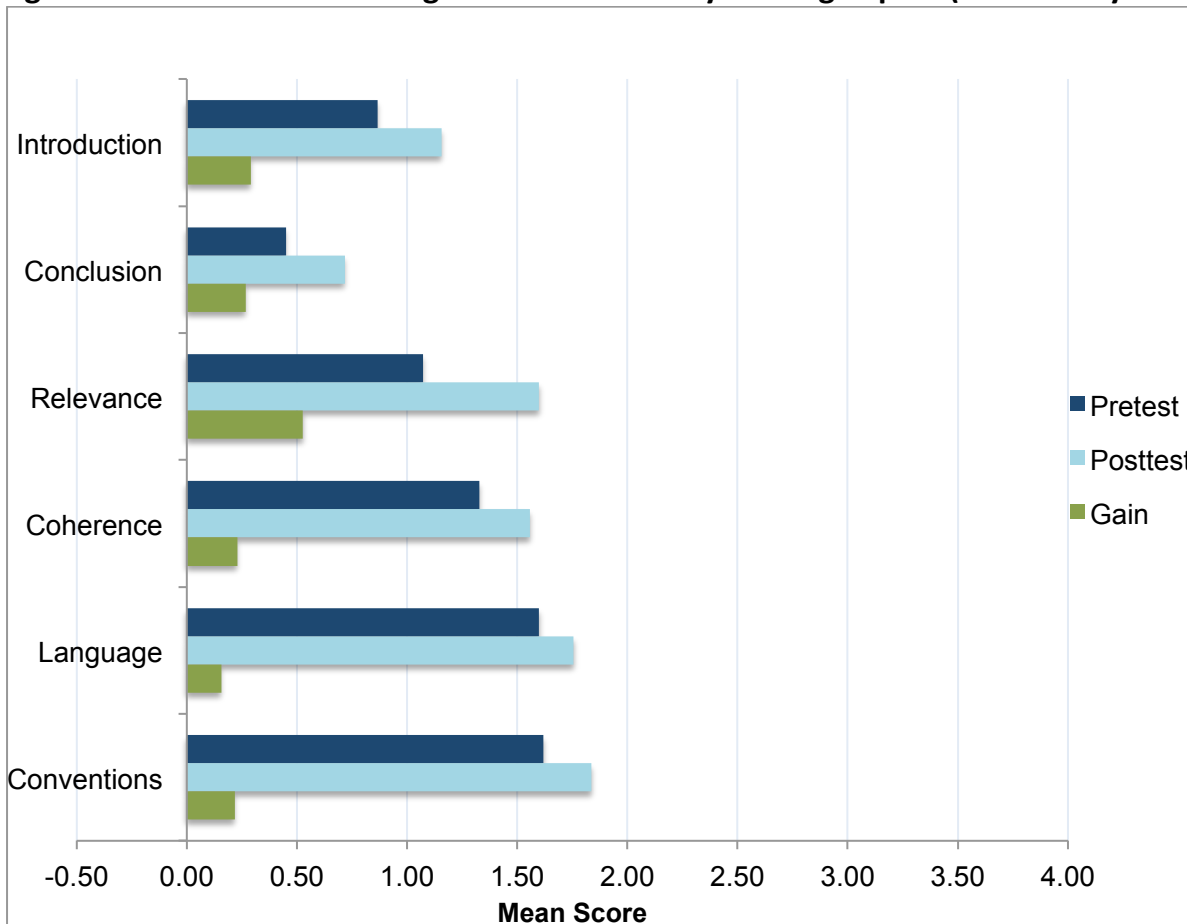
Table 4. Average Pre- and Posttest Scores and Gain (Elementary School).

	N	Pretest	Posttest	Gain
Introduction	131	0.87	1.16	0.29**
Conclusion	131	0.45	0.72	0.27**
Relevance	131	1.07	1.60	0.53***
Sequencing	131	1.33	1.56	0.23**
Language	131	1.60	1.76	0.16
Conventions	131	1.62	1.84	0.22**

** Significant at $p < 0.01$

*** Significant at $p < 0.001$

Figure 1. Pre- and Post Writing Scores and Gain by Writing Aspect (Elementary School)



Impact Analysis

In this section we describe the results of an analysis that compared scores for students in ThinkCERCA pilot classrooms to scores for students in comparison classrooms that were not using online courseware to support writing instruction. The impact results for ThinkCERCA are based on an analysis of improvements in student writing from one Wave 1 pilot site, Rocketship Education (RS). All students were in the 5th grade. Gains in writing scores from 65 pilot students in one school were compared to the gains for 52 students in a different school. The schools were in the same geographical area (urban and majority Latino) and the students were taught by a single teacher in each school.

For each aspect, we tested for the differences in gains scores (posttest minus the pretest) between the ThinkCERCA students and the comparison students.

Interpreting differences in gain scores. To aid in interpreting the differences in gain scores across sites and grade levels we report the difference in adjusted mean gain scores as a standardized **effect size**. An effect size expresses the difference between two scores in terms of how spread out the scores are. (Technically, the effect size is expressed in terms of standard deviations of the scores on the outcome measure). An effect size of 0.3, for example, means that one group on average scored 0.3 standard deviations more than the comparison group. This would apply whether the scale of the test score were 0 to 100, 150 to 600, or any other measure. That is, an effect size of 0.3 would essentially represent the same magnitude of difference regardless of the underlying point system used by the outcome measure. Because of this property, researchers commonly use effect sizes to compare the impacts of interventions across different tests. In addition to reporting effect size for each outcome measure analyzed, we translate the effect sizes into the expected percentile gain for average student in the comparison group if that student had been in one of the classrooms where a product was piloted. This is also known as the improvement index. For example, an estimated impact with an effect size of +0.25 standard deviations means that the average student in the comparison group would have scored at the 60th percentile, or an improvement of 10 percentile points, if that student had been in a classroom that piloted one of the products.

To estimate the effects we first ran a simple student-level regression model with the mean gain score for each student as the dependent variable (outcome) and pilot status as the predictor or independent variable (pilot group or comparison group). To compute the effect size, we divided the regression coefficient for the pilot status variable by the pooled standard deviation of the posttest score. The statistical results of the impact analyses are included in Appendix D.

We must remind the reader that these results are preliminary and should not be construed as definitive evidence of the effectiveness of the ThinkCERCA. In all cases, the gains in writing were measured over a single semester of product use and represent the first time teachers and students used the products in the classroom. It is likely that these results may not generalize to other schools and teachers and teachers with more experience using the products and more time to plan for the

products’ integration into their writing curriculum. Finally, even though the quasi-experimental design employed attempted to control for any pre-existing differences in writing skills between the pilot and comparison groups, the fact that districts, schools and, in some cases, teachers selected the products they wanted to pilot, we cannot rule out the possibility that pre-existing differences between teachers and students in the pilot classrooms and those in the comparison groups may explain a significant portion of the effects estimated.

Estimate of the Impact by Writing Aspect

Table 5 show the result of the impact analysis by aspect and district including the estimated effect sizes and improvement index. Recall that the score range for each writing aspect is from 0 (no evidence) to 4 (meets all elements of the rubric). Across all 6 writing aspects, these ThinkCERCA students showed greater gains from the pretest to the post-test when compared to students in the comparison group. The effect sizes range from .08 (Introduction) to .64 (Conventions). For 5 of the 6 aspects – Conclusion, Relevance, Coherence and Sequencing, and Language and Word Choice, and Written Conventions - the differences in the gain scores from pre- to post-test were statistically significant favoring the ThinkCERCA students.

Table 5. The Estimated Effect Size by Writing Aspect

Writing Aspect	Pilot				Comparison				Effect Size	Improvement Index ^a
	N	Avg. Pretest Score	Avg. Posttest Score	Gain	N	Avg. Pretest Score	Avg. Posttest Score	Gain		
Introduction	32	1.34	1.30	-0.04	52	1.41	1.29	-0.13	0.08	0
Conclusion	32	0.22	0.88	0.66	52	0.34	0.48	0.14	0.63*	24
Relevance	32	1.42	1.97	0.55	52	1.35	1.40	0.06	0.66*	24
Coherence	32	1.52	1.94	0.42	52	1.44	1.49	0.05	0.47*	19
Language	32	1.66	2.11	0.45	52	1.70	1.71	0.01	0.63**	24
Conventions	32	1.77	2.19	0.42	52	1.75	1.85	0.10	0.64**	24

*p<.05; ** p<.01

a = The **improvement index** can be interpreted as the expected percentile gain¹ for the average student in the comparison group if that student had been in one of the classrooms where the product was piloted.

¹ Percentile gain is a measure of change (either gain or loss) in a student’s test score. Typically, this is a way of indicating the impact of an effect size without having to describe the scale of the assessment. In Table 5 above, if students took a writing test scored on a 100-point scale (that measured the same attributes as above) rather than a 4 point rubric; a student in the comparison group using ThinkCERCA on average would score 0, 24, 24, 19, 24, and 24 points higher in each aspect respectively.

Figure 2. Introduction Aspect

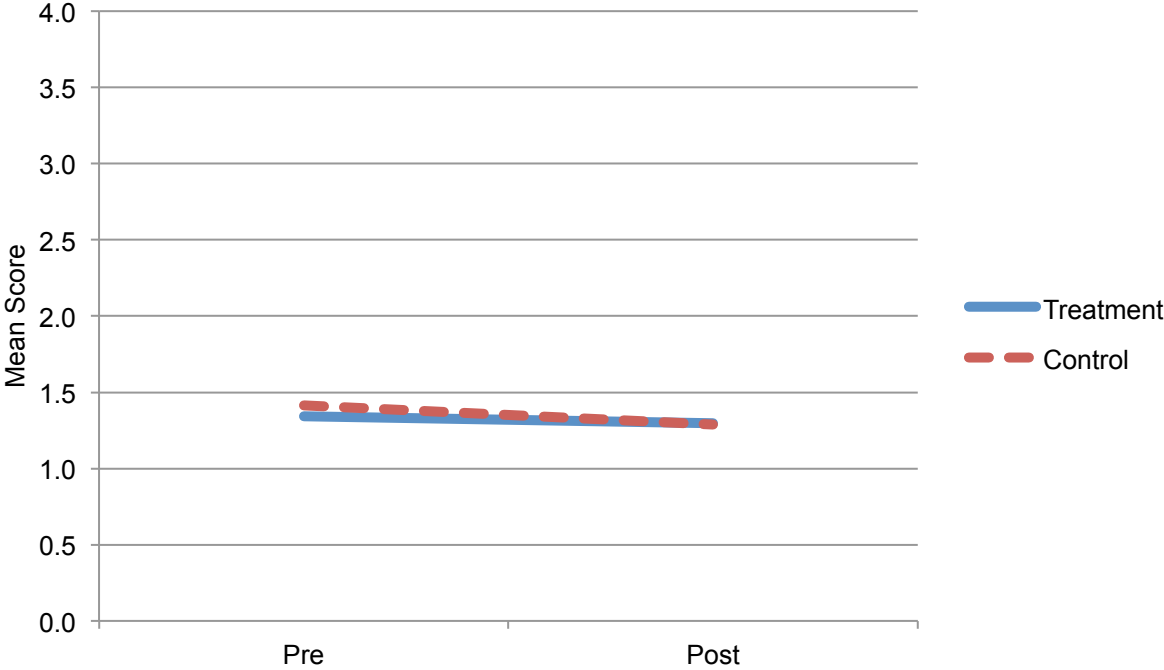
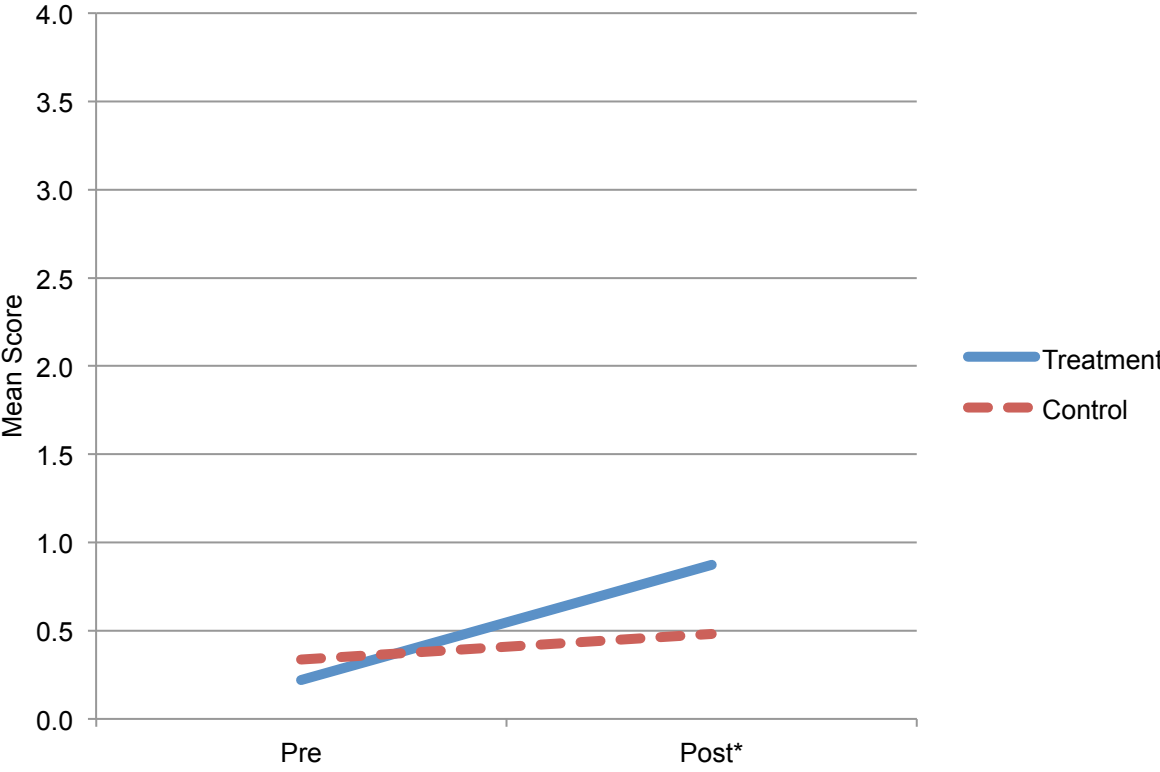


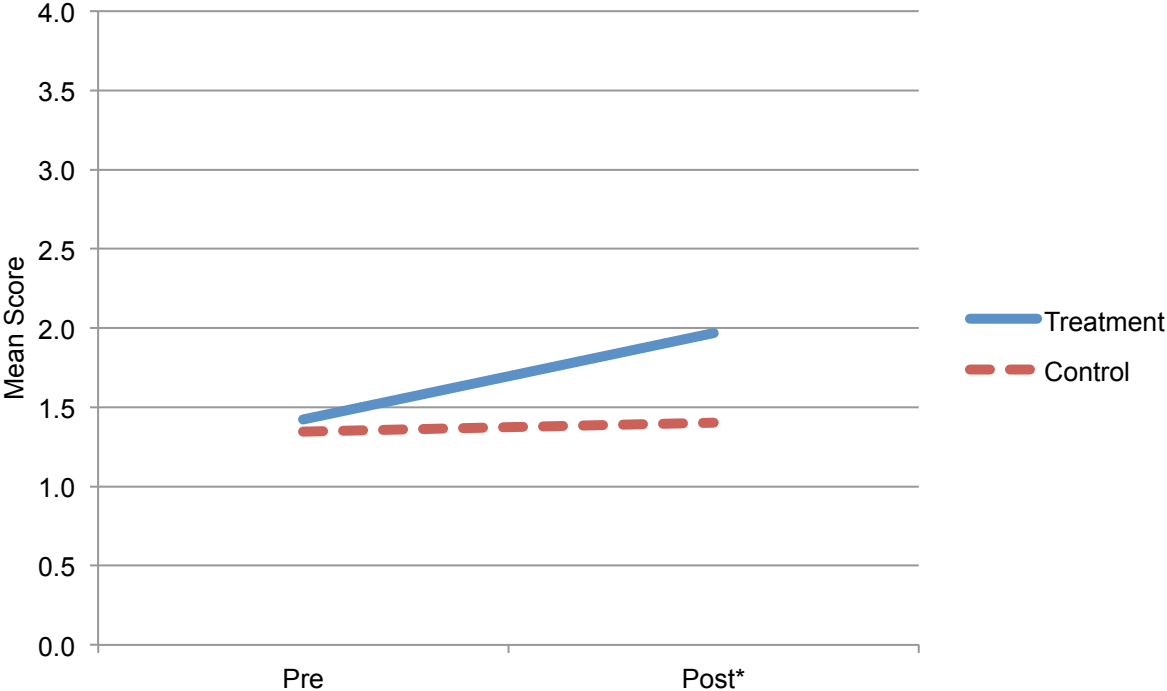
Figure 3. Conclusion Aspect



If either the Pre or Post has asterisks attached, it is an indication that the difference between the pilot group and the comparison group were statistically different.

* Significant at $p < 0.05$

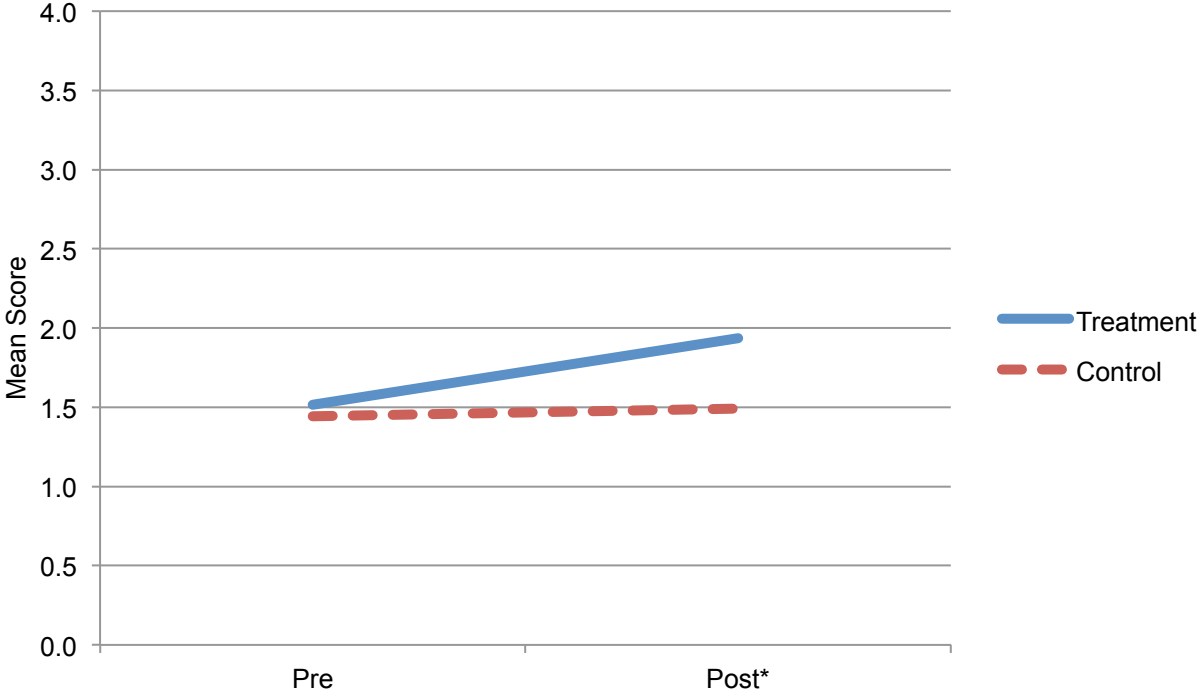
Figure 4. Relevance and Significance Aspect



If either the Pre or Post has asterisks attached, it is an indication that the difference between the pilot group and the comparison group were statistically different.

* Significant at $p < 0.05$

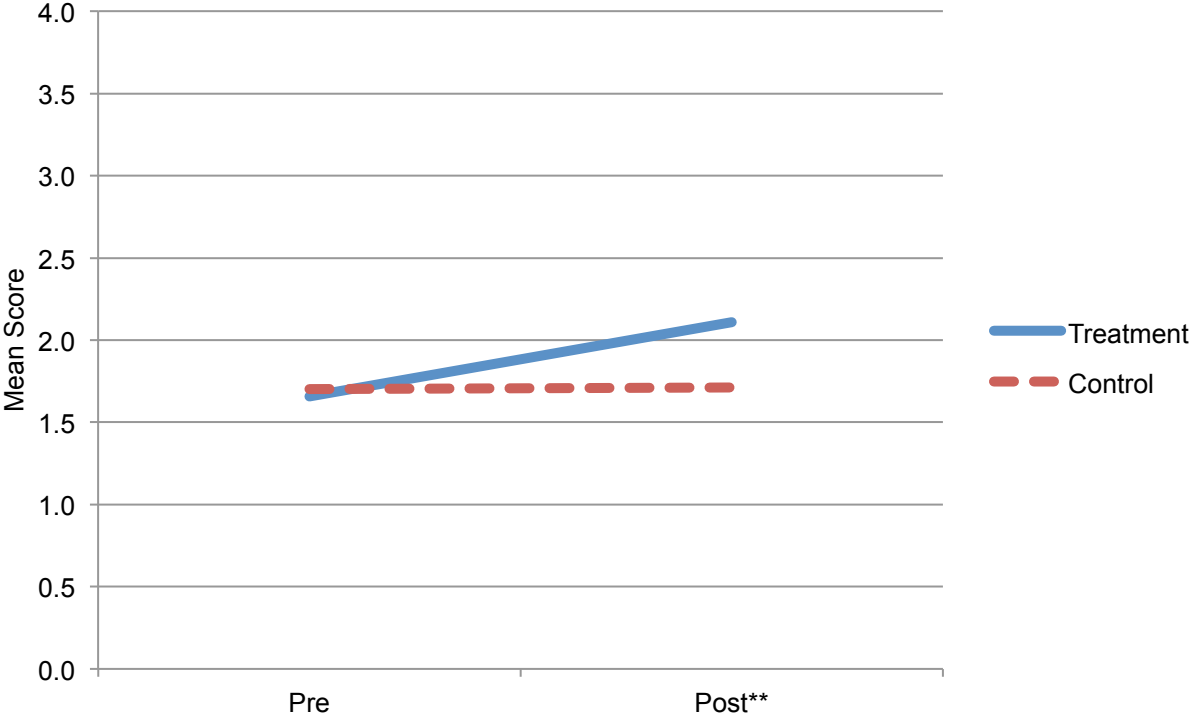
Figure 5. Coherence and Sequencing Aspect



If either the Pre or Post has asterisks attached, it is an indication that the difference between the pilot group and the comparison group were statistically different.

* Significant at $p < 0.05$

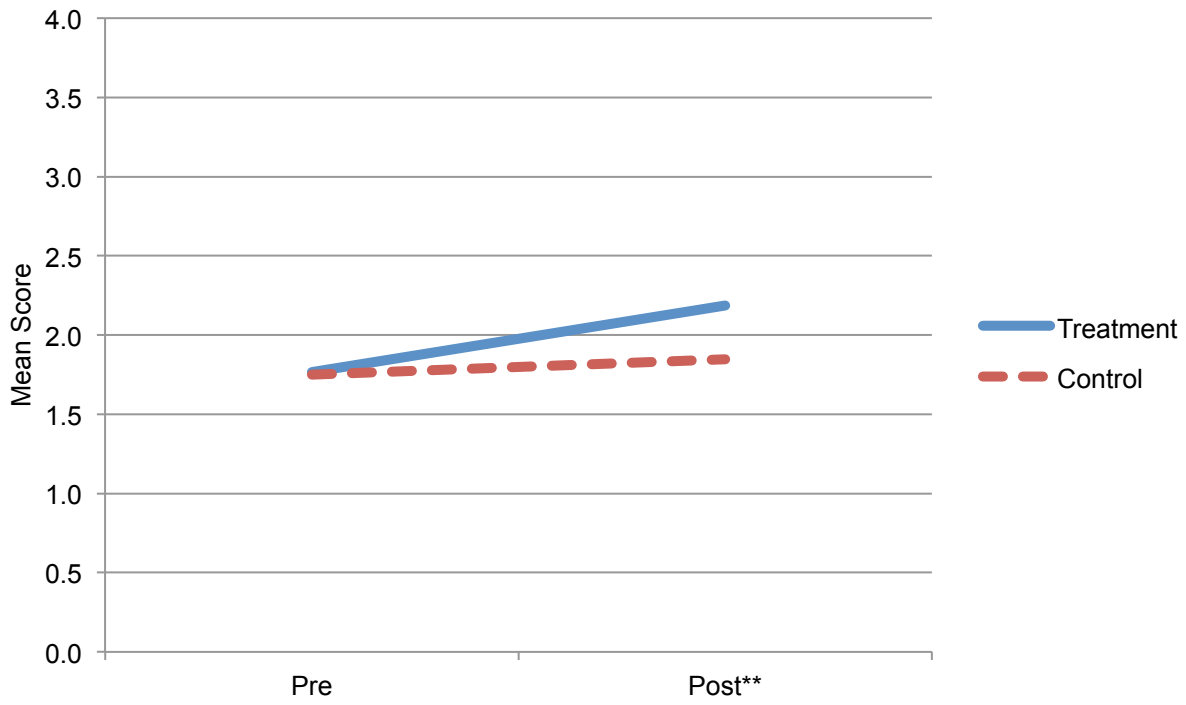
Figure 6. Language and Word Choice Aspect



If either the Pre or Post has asterisks attached, it is an indication that the difference between the pilot group and the comparison group were statistically different.

** Significant at $p < 0.01$

Figure 7. Written Conventions Aspect



If either the Pre or Post has asterisks attached, it is an indication that the difference between the pilot group and the comparison group were statistically different.

** Significant at $p < 0.01$

Appendix A – Writing Assessments (Delivered Online)

**Literacy Courseware Challenge
Writing Assessment Prompts**

(Elementary School – Grades 4 and 5)

Contents

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Title: The Arctic and Antarctica

Page 1:

Instructions:

Read the article presented on the next page.

Take notes on the two places discussed in the article – the Arctic and Antarctica.

Write an informational report that explains the similarities and differences between the Arctic and Antarctica.

Make sure you use evidence from the article in your report.

Page 2:

The Arctic is a polar region in the northern part of the Earth. Antarctica is a continent in the Earth's southernmost part of the world. The Arctic and Antarctica are two places on opposite sides of the world.

Read the article about the Arctic and Antarctica. While reading, take notes on the ways the two places are the same and the ways they are different.

After reading, write an informational report that explains the similarities and differences between the Arctic and Antarctica.

The Arctic and Antarctica: Are they the same or are they different?

[Adapted from <http://beyondpenguins.nsd.org> & "King of the Cold" by Steve Whitt and adapted by Jessica Fries-Gaither- <http://beyondpenguins.nsd.org>]

Have you heard of the Arctic and Antarctica? What do you know about them? Though they might seem very similar, there are also some differences between these two polar opposite places on planet Earth.

At the top of the world, the Arctic is a large ocean surrounded by land. This polar region has the North Pole in its center. The region is made of a huge, ice-covered ocean, the Arctic Ocean. Sea ice forms over the Arctic Ocean when the temperature is cold enough. There is more sea ice in the winter and less in the summer. The water and ice actually keep the temperature in the Arctic region from dropping too low. The North Pole is close to land, so warm air can float across the pole to warm it up. In the winter, the average temperature is 40 degrees below zero, and in the summer it rises to a high of 32 degrees.

The flat land in the Arctic is called the tundra. The tundra is covered with many small plants like shrubs, berries, grasses, and mosses. Whales, porpoises, and seals live in the Arctic region. On the tundra, there are moose, reindeer, caribou, wolves, and foxes. Polar bears also live there, hunting on the sea ice that covers the Arctic Ocean.

The Arctic region includes parts of eight countries. People have lived there for thousands of years. Today, about four million people live in the Arctic.

At the bottom of the world is Antarctica. It is a large continent surrounded by the Southern Ocean. Most of the land is covered by very thick ice. During the winter, water from the Southern Ocean also freezes and forms sea ice. The land is very high, which means the air there is cold. Think of tall mountains, always covered in snow. It's the same thing in Antarctica. The land is far away from other continents, so the cold ocean water and air currents circle the land keeping warm air out.

Antarctica is the coldest place on Earth, especially in winter when temperatures can reach 76 degrees below zero! Summer is warmer, but not really warm. At the South Pole, a typical summer day might have a temperature of 18 degrees below zero!

An interesting fact about Antarctica is it is a desert. The air is dry and cold, so it does not snow very often or very much. When it does snow, it never melts. The snow there gets slowly squeezed together to form thick ice. The ice on Antarctica is so white it reflects a lot of the sun's light, which keeps the ground cold.

Antarctica has only a few types of plants like grasses and mosses. During the warmer seasons, sea birds such as penguins, skuas and petrels, and land animals such as elephant seals, leopard seals and the Antarctic fur seal come to breed and raise their babies. The only other living things are very small insects, worms and tiny animals that live in the soil.

No humans actually live in Antarctica. It does not belong to any country. This means that there is no government in Antarctica. Scientists visit and work there, but they leave when their work is finished.

Some people may mix up the Arctic and Antarctica, but hopefully you can now see that there are many similarities and differences between the northern and southern most parts of the Earth.

Writing Assignment: Write an informational report that explains the similarities and differences between the Arctic and Antarctica.

Remember, a well-written informational report:

- Has an introduction that focuses the reader's attention and makes the reader want to know more.
- Uses specific evidence from the text to support statements about the topic
- Groups like ideas into paragraphs
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling and grammar
- Has a conclusion that leaves the reader feeling sufficiently informed about the topic

Title: Should we stop using pennies?

Page 1:

Instructions:

1. Read the article presented on the next page.

Take notes on the use of the penny.

Write an opinion article arguing either for or against the continued use of pennies.

Make sure you use evidence from the article to support your opinion.

Page 2:

There is a debate whether or not the United States should stop making and using pennies.

Read the article below that describes the pennies debate. While reading, consider both sides of the argument and take notes on whether the pennies should or should not still be in use. Then decide for yourself whether or not pennies should still be in use.

After reading, write an opinion article in which you argue either for or against the continued use of pennies.

Should the United States Use Pennies?

There is a debate in the United States over the use of the penny. Some people say it is time to stop making and using pennies, while others would like to continue using pennies. For each side of the debate, there are reasons getting rid of or keeping pennies. After reading the facts, see what you think the United States should do.

The first argument for getting rid of pennies is that it now costs more to make a penny than the penny itself is worth. If other coins were minted (made) instead of the penny, it is possible the government might save money. Others point out that the nickel also costs more to mint than it is worth. If the government stops minting pennies, people might start to use nickels more which would not solve the problem of coins costing more than they are worth.

Another argument for getting rid of pennies is that they are not as useful as they once were. With salaries for workers being more than they were in the past, and with prices having increased over time, the penny cannot buy what it could previously. In fact, pennies are not accepted by most vending machines or many toll booths. Pennies often end up sitting in jars or thrown away instead of being used.

A third argument against the use of pennies is that because of the way pennies are minted, they are more harmful if swallowed by children than other coins. Pennies, unlike other coins, contain a large amount of zinc which could cause children to get sick if swallowed. A way around this could be to change the materials that pennies are made of. Too, by changing the materials, the penny could also become cheaper to mint (make).

One argument for continuing to use the penny is people worry that if pennies were not used, then prices will be higher. Some researchers believe that prices would not be higher if the penny was eliminated. Other researchers believe that prices will be rounded up and people would end up paying more for most of the items they currently buy. This would especially affect families who make less money and are more likely to make smaller purchases more often.

Another concern for those who believe we should keep pennies is that charities might suffer because many of them depend on penny drives, a fundraising activity where people donate pennies to charities. The concern is that people would no longer be able to give pennies to these charities, and might not want to give higher amounts with coins that are worth more.

And finally, some people are sentimental about pennies. Americans have always had pennies and a beloved American figure, Abraham Lincoln is pictured on pennies.

Countries such as Canada, Denmark and Mexico have eliminated their lowest denomination coins. Should the United States do the same? What do you think?

Writing Assignment: Write an opinion article in which you argue either for or against the continued use of pennies.

Remember, a well-written opinion piece:

- Has an introduction that grabs the reader's attention and makes the reader want to know more
- Clearly states your opinion or claim
- Uses specific evidence from the text to support your opinion and explains your thinking
- Groups like ideas in the same paragraph
- Follows the rules for capitalization, punctuation, spelling and grammar
- Has a conclusion that answers the reader's questions and causes the reader to consider the writer's opinion

Title: Sahara and Antarctica – Two Deserts

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the two places discussed in the article – the Sahara Desert and Antarctica.
3. Write an informational report that explains the similarities and differences between the Sahara Desert and Antarctica.
4. Make sure you use evidence from the article in your report.

Page 2:

When picturing a desert, one may think that the desert is hot, but that might not always be the case.

1. Read the article below about the Sahara Desert and Antarctica. While reading, take notes on why these are both deserts and what is different about these two places.
2. After reading, write an informational report that explains the similarities and differences between the Sahara and Antarctica Deserts.

The Sahara and Antarctica – Two Deserts

On the African continent, the largest desert is the Sahara. It covers about 10% of the continent. Located on the northern part of the continent, its boundaries are defined by oceans and rivers across many countries in Africa.

The Sahara is one of the hottest regions in the world. The temperature can rise to 130 degrees Fahrenheit. What makes it a desert, however, is not the heat, but the fact that it is so dry. Rain does not come often. In some places in the desert, it can go a year or more without a single drop of rain. On average the desert receives less than 3 inches of rain a year.

When you think of a desert, you probably think of sand. In fact, less than a quarter of the Sahara is covered in sand dunes, but some of these sand dunes can reach over 500 feet tall. Other parts of the Sahara are rocky. The Sahara also includes several mountain ranges. One mountain range has a volcano that is over 11,000 feet tall.

There are about 500 species of plants that grow in the Sahara. These plants are mainly plants that can survive in very little water. Although 500 may seem like a large number, it is small compared to the over 18,000 species of plants that grow in the United States. The Sahara is home to different types of animals as well. There are more than 40 species of rodents, including the jerboa which is related to a mouse. Other larger animals include jackals and hyenas. People also live in the Sahara, the majority of which are nomads, or people who continuously move from place to place.

At the South Pole is the continent called Antarctica. It is very high land, rising almost 2,400 meters (about a mile and a half) from the ocean. The greater your distance from sea level, the colder the air around you becomes. Antarctica's height helps keep the area extremely cold, making it the coldest place on Earth! This also means it is one of the driest places on Earth.

Surrounded by the Southern Ocean, the waters slosh around Antarctica, blocking the path of warmer water from the north. The average winter temperature is 76 degrees below zero Fahrenheit. On a "warm" summer day, the temperature at the pole might reach 22 degrees below zero! The air circles the continent like ocean water, and the circle of freezing air prevents warmer northern air from reaching Antarctica. Usually, when temperatures drop, moisture in the air turns to rain or snow. But Antarctica lost its moisture long ago, so the climate is the coldest and driest on Earth! This makes Antarctica the largest desert on Earth!

That's right. Antarctica isn't only the coldest place on Earth; it's also one of the world's driest deserts. It might sound strange to call a land of frozen water a desert, but that's Antarctica. Because the air rarely changes, the skies are usually clear, and the new snow almost never falls.

The cold and dry climate of Antarctica makes it one of the toughest places on Earth to live. Few animals live there. Marine mammals, like whales and seals, only stay for a short time. Sea birds, like penguins, live on the Antarctic Peninsula.

The largest animal that lives year-round in the center of the continent is a tiny insect called a midge. The midge is around 12 millimeters long (about half an inch), and is a type of fly without wings (making it a fly that doesn't fly!). The tiny midge may be the king of beasts in this cold and dry place, but Antarctica itself is the real king--the King of Cold!

Writing Assignment: Write an informational report that explains the similarities and differences between the Sahara and Antarctica Deserts.

Remember, a well-written informational report:

- Has an introduction that focuses the reader's attention and makes the reader want to know more
- Uses specific evidence from the texts to support statements about the topic
- Groups like ideas into paragraphs
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that leaves the reader feeling sufficiently informed about the topic

Title: Year-Round or Traditional School Schedule

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the two types of school years: year-round or traditional.
3. Write opinion letter to persuade your principal to keep the traditional 9-month school year or to adopt a year-round school calendar.
4. Make sure you use evidence from the two articles to support your opinion.

Page 2:

In a traditional school year, students attend classes for about 9 months and then have a long break over the summer. There has been some debate whether moving to a school schedule where students attend school all 12 months, with shorter breaks during the year, is better for students.

1. Read the article below.
2. While reading, consider both types of school schedule and take notes on these two types of school years. Then decide for yourself whether you would prefer to have a traditional 9 month school year or a year round school calendar.
3. After reading the article, write an opinion letter to persuade your principal to either adopt the traditional 9-month school year or a year-round school calendar.

Traditional School Year or Year-Round Schooling – What do you think?

There are two types of schedules for schools in America, the traditional 9 month school year and the year-round school calendar. Some educators believe that the benefits of a year-round calendar outweigh those of the traditional 9 month school year. Others argue that the 9 month school year is better for students. What do you think is the best schedule for kids to learn?

The traditional 9 month schedule came about because a long time ago children were needed during the summer months to help harvest crops on family farms. Most children are no longer needed during the summer months for this reason.

Some studies suggest that students in year-round schooling benefit from the schedule. Researchers believe that students might not forget as much during smaller breaks as they do with a long summer break. This would mean that teachers would not have to spend as much time re-teaching what students have learned already when they start a new year.

Having breaks that are shorter and more frequent might provide families more options for planning vacations and outside enrichment activities. Families can plan their vacation at different times during the year. After having smaller breaks during the year, students and teachers will be excited about vacations and feel more refreshed when they return to school.

Schools like New Stanley Elementary school, in Kansas City, Kansas have year-round schedules where students go to school for 10 weeks and then have between 2 and 3 weeks off. Teachers there use some of the time off for training and planning. They believe that the training

they receive and having the time to plan throughout the year lead to more productive work with students.

Some schools have a schedule where different groups of students are at school on a rotation schedule, meaning at any time, there are groups of students in school and groups on break. This means not all students are at school on any given day. This means schools can have more students in the same school throughout the year, and districts would not have to build as many new schools when enrollment goes up, which might save districts money.

Research has not proven that a year-round school helps students learn. Some research shows that students might do as well as, or better than those in traditional schools, but not necessarily because of the schedule. Year-round schools often have extra programs to help students which might be why they do better.

Because some year-round schools have different schedules such as 10 weeks in school and 3 weeks off, or 12 weeks in school and 4 weeks off, families who have children in different schools or on different schedules find it harder to schedule family vacations and activities.

Older students may have a difficult time finding a job if they have shorter breaks. Businesses may not want to hire students either in the off-season (not during traditional summer break) or for such short periods of time. Some summer or after-school programs may have trouble filling their enrolment if students' schedules change, which may result in programs being canceled.

Teachers often take summer classes and attend trainings to keep up with trends in teaching. Year-round school schedules could prevent them from participating in these. Too, they may find they do not have enough planning time with shorter breaks.

While schools may be able to have more students attending their school, some administrators believe having schools in constant use costs more money because of the wear on the facilities and materials.

There are arguments for a traditional 9 month school year, and a year-round calendar. The school calendar affects students, families and teachers. What do you think? Should schools have a traditional or year-round schedule?

Writing Assignment: Write an opinion letter to persuade your principal to either adopt the traditional 9 month school year or to a year-round school calendar.

Remember, a well-written opinion piece:

- Has an introduction that grabs thereader's attention and makes the reader want to know more
- Clearly states your opinion or claim
- Uses specific evidence from the texts to support your opinion and explains your thinking
- Groups like ideas in the same paragraph
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that answers the reader's questions and causes the reader to consider the writer's opinion

**Literacy Courseware Challenge
Writing Assessment Prompts**

(Middle School: Grades 6, 7, and 8)

Contents

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Title: Banning the Sale of Ivory

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the effects of selling ivory.
3. Write a letter to a member of CITES explaining whether or not you think the selling of all ivory should be banned.
4. Make sure you use evidence from the article to support your opinion.

Page 2:

Ivory is a hard, white material that comes from the tusks of animals. Often animals are killed just for their tusks. One way that people have been trying to stop the killing of these animals is by banning the sale of ivory.

1. Read the article below and learn about the role of selling ivory in the decline of elephants. While reading, consider the facts and take notes on what you read. Then decide for yourself: Should the sale of ivory be banned?
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) continues to monitor the selling of ivory. After reading the article, write a letter to a member of CITES explaining whether or not you think that the selling of all ivory should be banned.

Banning the Sale of Ivory

Ivory is a hard white material that has been used to make jewelry, figurines, and other items. Although ivory can come from many species, including the hippopotamus and the walrus, the main source of ivory is from the tusks of elephants. In areas such as Africa and Asia, elephants have been hunted for their tusks, causing a huge decrease in the elephant population.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement whose focus is on the preservation of animals and wildlife. Depending on the category that CITES assigns animals, certain trade limitations are in place. If CITES lists the animals as endangered, then trade between countries this animal inhabits is permitted only in exceptional circumstances. If CITES lists the animal as threatened, CITES also determines any restrictions on the trade of this animal.

In 1975 the Asian elephant was listed by CITES as endangered. This means that Asian elephant tusks are not allowed to be traded; however, the CITES agreement states that any elephant ivory that was obtained before the start of the CITES agreement is allowed to be traded. In 1977 the African elephant was listed by CITES as threatened. Countries who were selling ivory were supposed to make sure that their export of ivory was not causing harm to the survival of the species. Ten years later it was discovered that the African elephant population had been reduced by more than half as a result of elephants being killed for their ivory tusks. Illegal ivory was being passed off as legal ivory and sold. Consequently, CITES banned the international commercial trade of all African elephant ivory.

In 2000, 2002, and 2008 CITES allowed a “one time” trade of stockpiles of ivory (ivory that was supposed to be obtained legally or obtained before the agreement) between countries. Even with these precautions, the Asian elephant remains endangered and the African elephant remains threatened. Poachers are still killing elephants for their ivory.

Countries in Africa have been working against the selling of elephant tusks. Recently the country of Gabon, in central Africa, burned all of their stockpiles of tusks. This was a statement to protest the selling of ivory. By burning their stockpiles, the countries are making the statement that they will not be selling any ivory. This is an attempt to stop poachers from killing the elephants, as no sale of ivory would be allowed from this country.

The killing of elephants is not the only way to obtain ivory. There are other animals that produce ivory, and ivory can be taken from dead animal carcasses. In parts of Russia, people search for mammoth tusks. Mammoths have been extinct for years, but many of their tusks remain buried. Finding and selling these tusks has helped the economy of specific regions of Russia; however, there is a limited supply of these tusks and already they are becoming harder to find.

Another alternative to animal ivory is something people refer to as “vegetable ivory.” This material is found in the tissue produced inside the seeds of certain types of palm trees. One place to find these palm trees (sometimes referred to as ivory-nut palms) is in South America. The vegetable ivory has a texture and hardness similar to ivory. A single palm may produce about the same amount of ivory in a year as an average African elephant tusk. One important difference between elephant ivory and vegetable ivory is that the palm will continue to produce ivory year after year. A drawback to the vegetable ivory is that it is smaller in size. The ivory would have to be processed and bonding cements would have to be used to combine multiple nuts to obtain larger objects. Still, many are hoping that vegetable ivory will become more popular, and, in doing so, will save the elephant population.

Writing Assignment: The Convention on International Trade in Endangered Species of Wild Fauna and Flora continues to monitor the selling of ivory. Write a letter to a member of CITES explaining whether or not you think that the selling of all ivory should be banned. Use information from the article to support your position.

Remember, a well-written piece of argument writing:

- Has an introduction that grabs the reader’s attention and makes the reader want to know more
- Clearly states your opinion or claim
- Uses specific evidence from the text to support your opinion and explains your thinking
- Groups like ideas in the same paragraph
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that answers the reader’s questions and causes the reader to consider the writer’s opinion

Title: Invasive Species

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the similarities and differences between the Burmese Python and the Australian pine.
3. Write an informational report that informs readers about the similarities and differences between the Burmese Python and the Australian pine.
4. Make sure you use evidence from the article in your report.

Page 2:

What happens when a new plant is introduced into the environment? How can they harm the plants and animals that live in that environment?

1. Read the article below about invasive species. While reading, take notes on the similarities and differences between the Burmese Python and the Australian pine.
2. After reading, write an informational report that informs readers about the similarities and differences between the Burmese Python and the Australian pine.

Invasive Species

Every species of plant or animal has a home in some part of the world, where it has existed for thousands of years as a result of natural forces. A native species is one that occurs in a particular region, ecosystem, and habitat without direct or indirect human influence.

Species are considered to be non-native when they occur artificially in locations beyond their known historical natural ranges. Non-native can refer to species brought in from other continents, regions, ecosystems and even other habitats. Non-native species to the U.S. include those transported from Europe, Asia, Africa, South America, Australia and other parts of the world.

The most important aspect of a non-native species is how it responds to a new environment. An invasive species is a non-native species, whose population increases very quickly in the new environment. This increase in population produces a threat to the new environment. This is because they can be harmful to the native species of that environment. An animal invasive species might prey on native animals in the environment and therefore reduce the population of the native animals. A plant invasive species may reduce the amount of resources needed by the native plants and reduce the number of native plants.

Not all non-native species are considered harmful. For example, a small number of non-invasive non-native plants (e.g., corn, wheat, oats) form the basis of our agricultural industry and pose little to no threat to our natural ecosystems. However, each non-native plant is one less native host plant for our native insects, vertebrates and other organisms that are dependent upon them.

Burmese Python

One example of an invasive species is the Burmese Python. The Burmese python is a large snake native to Southeast Asia. This animal was brought into the United States and sold for pets. However, some pet owners were unable to handle a fully grown python and released their python into

the wild. The population of Burmese pythons has been growing in the Everglades National Park in Florida, in part due to the climate in the Everglades.

Burmese pythons are a threat to the endangered wildlife in the Everglades. These pythons are known to eat a variety of mammals and birds. One animal they prey on is the Key Largo woodrat which is an endangered species, in risk of extinction. They have also been known to eat other animals that are close to being put on the endangered animals list such as the American alligator and the white ibis bird. The removal of these animals from the ecosystem may cause problems for other animals in the ecosystem. For example, the population of indigo snakes may be in danger. Since the indigo snakes and the Burmese pythons both eat the same animals, the presence of the Burmese pythons means there is less food for the indigo snakes and therefore the population of indigo snakes may decrease.

Australian Pine

Another example of an invasive species is the Australian pine. The Australian pine is a tall tree that is native to Australia and Southeast Asia. This tree was originally brought into Florida to help with the stabilization of ditches and canals. However, it has spread and has taken the place of native dune and beach vegetation.

The Australian pine can be planted in soil that does not have many nutrients, which makes it easier for dense thickets of pines to grow. Once planted, it can change the chemistry of the soil, as well as the amount of light available. These changes make it difficult for other plants to grow around and underneath it. This has caused the decrease in other native plants as well as the destruction of the habitat for some native insects and other wildlife. For example, the Australian pine has affected the nesting sites of sea turtles, thereby endangering the population of sea turtles.

Writing Assignment: Write an informational report that informs readers about the similarities and differences between the Burmese Python and the Australian pine. Use specifics from the article to support your report.

Remember, a well-written informational report:

- Has an introduction that focuses the reader's attention and makes the reader want to know more
- Uses specific evidence from the text(s) to support statements about the topic
- Groups like ideas into paragraphs
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that leaves the reader feeling sufficiently informed about the topic

Title: Life in the 1760s

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the lives of children who lived in the 1760s.
3. Write an informational report comparing your day-to-day life with a child's life in the 1760s.
4. Make sure you use evidence from the article in your report.

Page 2:

Life in the 1760s was very different from life today. Many of today's conveniences were not available in the mid-1700s.

1. Read the summary information below about life in the 1760s, which is based on John Bach McMaster's *A School History of the United States* (<http://www.gutenberg.org/cache/epub/11313/pg11313.html>) and the stories of two children who lived at that time. While reading, think about and take notes on the differences between the lives of children who lived in the 1760s and the life you lead today.
2. After reading, write an informational report comparing your day-to-day life with a child's life in the 1760s.

Life in the 1760s

Most of the conveniences we know today were not available in the 1760s during Colonial times. In 1763 electricity was considered a scientific toy. Benjamin Franklin had just proved by his experiment with a kite that lightning and electricity were one and the same. Other men were experimenting by ringing bells, exploding gun-powder and making colored sparks with electricity, but it was not being put to use for everyone. Families had to fend for themselves, providing their own food, tools, and other necessary resources to survive.

In the 1760s, children were sent to school mainly to learn to read, write and do arithmetic, because those were the skills needed to run a household. If a town had a schoolhouse, it was generally one room with one teacher who taught children from ages 6 to 12. Children were expected to walk to and from school. If there were no school in town, children were taught at home. Not all children stayed in school until they were 12; some were kept at home to help around the house once they learned the basics at school.

One example of a child's life in the colonial period is Almanzo. Almanzo was a boy who lived with his family on a farmstead. His brothers, father, uncles and he hunted wild birds and animals for meat, and cut down trees for their firewood. They grew much of their food on the farm, working from early spring through late fall to plant, tend and harvest the crops. They couldn't wait until the winter came, or else the crops would freeze. At the age of nine, Almanzo was expected to be apprenticed to a cooper shop or as a silversmith. A cooper shop or cooperage is where wooden barrels and wheels were made for storage and transportation. Apprentices were expected to learn their trade over seven years before they could work on their own.

Almanzo loved playing stick ball and other ball games. One was called "rounders" which is very similar to today's baseball. On summer days, he and his brothers and friends would go outside to play, get fresh air and clear their heads. They also played checkers, marbles, tag, leapfrog, and hopscotch.

On windy days, they would fly kites they had made from materials found on the farm, and in winter, when they couldn't be outside they would play Cat's cradle and with spinning tops. Most of their toys were hand-made by their relatives. Some toys were brought over from other lands, like sleds from Holland. Children made dolls out of corn-husks or rags. People told stories which had been handed down from past generations, called folktales.

Another example is Elizabeth, a girl from the 1760s. She worked in the house with her mother, grandmothers, aunts and cousins to make soap and candles. They made soap by combining wood ashes and animal fat. Candles were made by dipping strings repeatedly into a pot of boiling wax and tallow, and provided light in the nighttime, especially during the long winter nights. Girls like Elizabeth learned to knit and sew from their female relatives at a very young age. They were expected to make a "sampler," which is a small decorative piece of cloth with a sampling of their sewing skills to show what they had learned.

Elizabeth rose very early every morning to do her chores such as sweeping, feeding chickens, milking cows, watering horses, picking berries from the forest, gathering peas, onions, turnips and other vegetables from the family garden, and eggs from the chicken coop. She would help cook breakfast, a midday meal, and dinner.

Most colonial families, including the Almanzo's and Elizabeth's were very big. It was not unusual to have 9 children, as well as aunts, uncles and grandparents all living in one house. All members of the family worked hard every day to provide their food and other necessities. They were self-reliant, meaning they were able to satisfy their needs without help from anyone else.

Writing Assignment: Write an informational report comparing your day-to-day life with a child's life in the 1760s. Use specifics from the article to discuss some of differences between your life and theirs.

Remember, a well-written informational report:

- Has an introduction that focuses the reader's attention and makes the reader want to know more
- Uses specific evidence from the text to support statements about the topic
- Groups like ideas into paragraphs
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that leaves the reader feeling sufficiently informed about the topic

Title: Year-Round Schools and Traditional Schools

Page 1:

Instructions:

1. Read the article presented on the next page.
2. Take notes on the two types of school years: year-round or traditional.
3. Write opinion letter to persuade your principal to keep the traditional 9 month school year or to adopt a year-round school calendar.
4. Make sure you use evidence from the article to support your opinion.

Page 2:

In a traditional school year, students attend classes for about 9 months and then have a long break over the summer. There has been some debate whether moving to a school schedule where students attend year-round, with shorter breaks during the year, is better for students.

1. Read the article below.
 2. While reading, consider both types of school schedule and take notes on these two types of school years. Then decide for yourself whether you would prefer to have a traditional 9-month school year or a year-round school calendar.
 3. After reading, write an opinion letter to persuade your principal to either adopt the traditional 9-month school year or a year-round school calendar.
-

Year-Round Schools and Traditional Schools

Although further research needs to be done, some initial studies have found that year-round school schedules can benefit students. Historically, the traditional school year was developed from the need for children to be at home during the summer months to help harvest crops, which is no longer the case for most families. Educators are debating the issue of which is better, the traditional 9 month school year with a lengthy summer break, or the year-round model where students attend school throughout the year but take shorter, more frequent breaks during the year.

Studies have shown that, on average, the United States has fewer school days, and students spend fewer hours focusing on core academic classes than students in other countries. Some people have expressed concern that students attending American schools will not be able to compete with graduates from other parts of the world, where students spend more time on average in school. Some people feel year-round schooling can make it easier to provide more time in the classroom for students.

There are other reported benefits to year-round calendars. There are reports that students forget much of the content they learn during long summer breaks, requiring teachers to start the year by reviewing previous content. This detracts from the limited time students have for learning the new content. Although research is inconclusive as to whether year-round schooling counteracts this issue, students in year-round schools do at least as well as, if not better than those in traditional 9 month schools.

Year-round calendars include shorter breaks more frequently which could provide families with options for taking vacations and enrichment activities outside of school, as these activities could be planned throughout the year instead of only in the summer months. Breaking up the year may also allow students and teachers to feel more refreshed and thus be more engaged during school activities. There are many examples of schools benefiting from year-round schedules. At New Stanley Elementary, in Kansas City, Kansas, they are open for 11 months every year. Students attend school

for 205 days a year, with ten weeks in school followed by a 2-3 week break. The time off is used by teachers for professional development and planning, and teachers report being more prepared for their students on this schedule. The students are graduating from this school performing at or above their peers at the national level (National Education Commission on Time and Learning, April 1994 Report).

Some schools adopt a schedule that allows multiple groups of students to be on different “tracks” - meaning some groups of students are in session while others are on break. This allows for increased enrolment at the schools, and districts report cost savings from not having to maintain more schools and facilities.

Although there are benefits reported for year-round calendars, other factors may be responsible for variations in student performance in these schools. Parent education levels can affect the differences found in performance levels, as well as the fact that year-round schools may offer more enrichment activities. One detractor from the year-round system is that no set schedule exists for year-round schools. So families cannot depend on having the same schedule for all of their children. This could deter from their ability to spend time on vacation or doing activities outside of school.

If school schedules change then other programs and businesses will need to adapt to this schedule. Some summer and after-school programs may have trouble filling their minimum enrolment requirements and thus might need to be canceled. The summer season is often a time when high school students find seasonal work. This helps the businesses because there is greater demand during the summer months and the high school students can help with this demand. However, if the school schedule changes then businesses may not want to hire workers who can only be available for one to four weeks, and students may find it difficult to find work that fits with the year-round schedule.

Some districts find using facilities year-round can increase costs. The burden of maintaining schools year-round means costs increase from increased use, and maintenance crews do not have long breaks for major work. Some teachers worry that they cannot attend summer classes and workshops if they have a year-round schedule, or find time to do longer term planning, because they have shorter, more frequent breaks instead of long periods of time off to train and plan. And teachers have reported that they have to review previously taught material even after shorter breaks.

A change from a traditional 9 month school calendar to a year-round schedule requires adjustments not only for the students and teachers, but also businesses, educational programs outside of school, and families. More research needs to be done before making the final decision on which schedule is best for students.

Writing Assignment: Write an opinion letter to persuade your principal to either adopt the traditional 9-month school year or a year-round school calendar. Use evidence from the article to support your opinion.

Remember, a well-written piece of opinion writing:

- Has an introduction that grabs the reader’s attention and makes the reader want to know more
- Clearly states your opinion or claim
- Uses specific evidence from the text(s) to support your opinion and explains your thinking
- Groups like ideas in the same paragraph
- Uses precise language and transition or linking words to connect ideas
- Follows the rules for capitalization, punctuation, spelling, and grammar
- Has a conclusion that answers the reader’s questions and causes the reader to consider the writer’s opinion

Appendix B – Scoring Process and Rubrics

Scoring Process

Each student response to a writing prompt was scored on 6 aspects of writing: Introduction, Conclusion, Relevance and Significance, Coherence and Sequencing, Language and Word Choice of Language, and Written Conventions. The papers for each wave were scored using the automated scoring engine described below. A sample of student writing samples collected during the piloting of wave 1 and 2 products were hand-scored by experienced ELA teachers and SRI research staff and used to train the automated scoring engine. Aspects were scored on a range of 0 to 4, with 0 indicating a lack of the aspect, too few words to score, or plagiarized material, and a 4 indicating an ideal response to the prompt.

Automated Text Scoring Engine. SRI developed an open-sourced automated text scoring engine to address the need for a CCSS-aligned, multi-trait explanatory scoring system that could efficiently and reliably score extending writing samples collected from students participating in the study and, more broadly, be used widely to support effective implementation of the writing standards in the CCSS. To address key CCSS-substandards, we reviewed and supplemented several existing approaches to the automated scoring of writing with novel discourse and lexical-semantic analytic methods, in order to implement analyses that have a clear grounding in human understanding, and which could be validated against human scoring methods. Instead of latent semantic analysis², we used information theoretic methods, such as term co-clustering and multi-word unit recognition, which we've demonstrated in other research to be superior in a number of other text analytic problems for the problem of modeling the topical, conceptual-semantic space.

SRI's Automated Text Scoring Engine (ATSE) is a trainable, domain-independent software system that learns to assign numeric scores to texts. The engine uses advanced text analysis algorithms to identify features of interest in texts, such as word or phrase meanings and discourse relationships. Then, using a machine learning architecture and a training set of hand-scored example texts, the engine learns by example to assign scores based upon the identified features. In this study, we found that (given approximately 150 training texts, written by 3rd-8th graders, and hand-scored using a multi-trait Common Core aligned rubric) the accuracy with which ATSE was able to reproduce the scoring patterns of expert human scorers was statistically indistinguishable from that of an independent human scorer.

The engine uses a technical approach informed primarily by an in-depth analysis of the published approaches of winners of the Hewlett Foundation's Automated Essay Scoring competition, hosted on Kaggle³. SRI developed ATSE by selectively combining the approaches used by the competition's winners, and enhancing it with some of SRI's key text analytic and machine learning innovations.

One key innovation used within ATSE's approach is its lack of dependence upon pre-trained models of language use. Traditional natural language processing approaches rely upon large collections of

² Landauer, T. (2007). *The handbook of latent semantic analysis*. Mahwah, NJ: Erlbaum.

³ <https://www.kaggle.com/c/asap-aes>

annotated data, which are used to train models for such things as parsing and part of speech tagging. SRI's algorithms, which are the result of more than a decade of advanced research on unsupervised machine learning and computational linguistics, do not require pre-trained background models. Instead, our algorithms study the corpus of texts to be analyzed and automatically infer syntactic and semantic patterns directly from them. This allows ATSE to be applied across any domain and text type, without risk of misalignment between background models and the texts to be scored.

Another key innovation of ATSE is its alignment with Common Core writing standards. Several of its text analytic algorithms have been specifically designed to predict the quality traits associated with Common Core writing sub-standards. For example, as part of the LCC project, the engine was used to score essays along six Common Core aligned traits: Introduction, Conclusion, Coherence and Sequencing, Relevance and Significance, Conventions, and Language and Word Choice.

It is standard practice, and generally required for good performance, that scoring engines be trained in a prompt-specific way. To score responses to a given specific prompt, the engine must be trained using a collection of hand-scored responses to the same prompt. The ATSE engine, however, is not entirely bound by this restriction. We conducted a pilot investigation to study whether ATSE could be trained using a collection of responses from *multiple* prompts, and then be used to accurately score responses to a previously unseen prompt. We found that it performed at or above 80% of human scoring accuracy on this task. This confirms the utility of our domain-independent approach and is the starting point for our proposed work on "prompt-blind" scoring in this project.

Introduction

- Claim that relates to the topic
 - Preview of the content
 - Engagement – causes the reader to want to read the writer’s opinion
- 4** Introduction includes a clearly states claim provides a clear preview of the content, and engages the reader.
- 3** Introduction includes a states claim and provides some preview of the content.
- 2** Introduction includes a claim, but no preview of the content
- 1** Evidence of trying to introduce the work, but there is no claim.
- 0** No evidence of an introduction to frame the writing for the reader, or the work is plagiarized.

Conclusion

- Claim that relates to the topic
 - Review of the content
 - Engagement – causes the reader to consider the writer’s opinion
- 4** Conclusion includes a clearly restated claim, provides a clear review of the content, and engages the reader in considering the writer’s opinion.
- 3** Conclusion includes a restatement of claim and provides some review of the content.
- 2** Conclusion includes a restatement of the claim but no review of the content.
- 1** Evidence of trying to conclude the work, but no restatement of a claim.
- 0** No evidence of a conclusion to frame the writing for the reader, or the work is plagiarized.

Relevance and Significance of Evidence

NOTE: Requires a close reading of each of the stimuli (prompts) before scoring.

- Clarity of support for a claim for the prompt
 - Evidence is content based and from the passage but not plagiarized
 - Degree of elaboration or details once the claim is deemed relevant
- 4** All evidence clearly supports the prompt, is based on the passage, and is sufficient in elaboration or details.
- 3** Most evidence is relevant to the prompt, based on the passage, and includes some elaboration of details.
- 2** Evidence is relevant to the prompt and is based on the passage, but includes minimal elaboration, or all of the details are not significant.
- 1** Evidence is related to the prompt but is not clearly based on the passage and/or includes no elaboration.
- 0** No evidence from the passage, or the work is plagiarized.

Coherence and Sequencing of Ideas

Coherence – as a piece that can be followed and as the bigger idea addressed throughout the body of writing.

- Ideas are grouped by topic
 - Ideas flow logically and the relationships are clear, making it easy to follow the progression of ideas
 - Summative work is cohesive
- 4** Ideas are grouped by topic and the ideas flow logically with clear relationships, making it easy to follow; and summative work is cohesive.
- 3** Ideas are grouped by topic and the ideas flow logically with clear relationships, making it easy to follow; summative work is NOT cohesive
- 2** Ideas are grouped by topic, but some ideas do not flow logically
- 1** Ideas are not grouped by topic and/or there is no logical flow of ideas.
- 0** No concrete ideas, or the work is plagiarized.

Language and Word Choice

- Language is clear
 - Word choice is sophisticated
- 4** Almost all of the language is clear and the word choice is often sophisticated.
- 3** Much of the language is clear and the word choice is sometimes sophisticated.
- 2** Some of the language is clear and/or the word choice is mostly basic.
- 1** 2 or fewer sentences or most of the language is unclear.
- 0** No clear language or the work is plagiarized. (NOTE: If you can't make sense of any sentence, then the paper is scored 0.)

Written Conventions

Standard conventions: *grammar, capitalization, punctuation and spelling*

Interference – lack or misuse of conventions interferes with the meaning

NOTE: Lack of conventions due to typing (e.g., spacing between a period and capital) should not be considered an error in conventions.

NOTE: Special conventions such as italics, underlining, and bold are not available within the current system.

- 4** Consistently demonstrates an exemplary command of written conventions; may have minor errors that do not interfere with meaning.
- 3** Demonstrates a command of written conventions; contains some errors that do not interfere with meaning.
- 2** Demonstrates a limited or inconsistent command of written conventions; some errors interfere with meaning.
- 1** 2 or fewer sentences, or the work demonstrates a weak command of written conventions; many errors interfere with meaning.
- 0** Demonstrates no command of written conventions, or the work is plagiarized.

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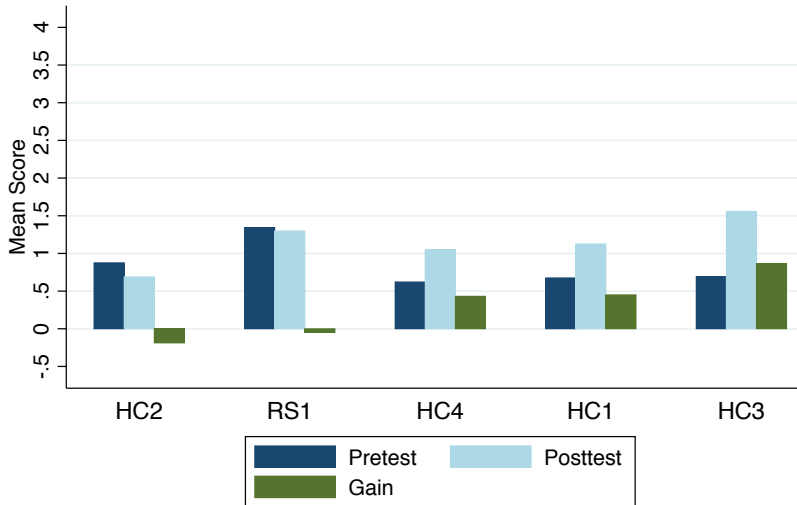
Appendix C

Distribution of Gain Scores by Teachers

As a further exploration of student writing in pilot classrooms, we provide results of an analysis of gains in writing skills by teachers within district that piloted ThinkCERCA. In the following figures, each set of bars represents the pre- and post gains by teacher’s classrooms.

Abbreviation	District Name
RS	Rocketship BayArea Charter Schools
HC	Henry County School District

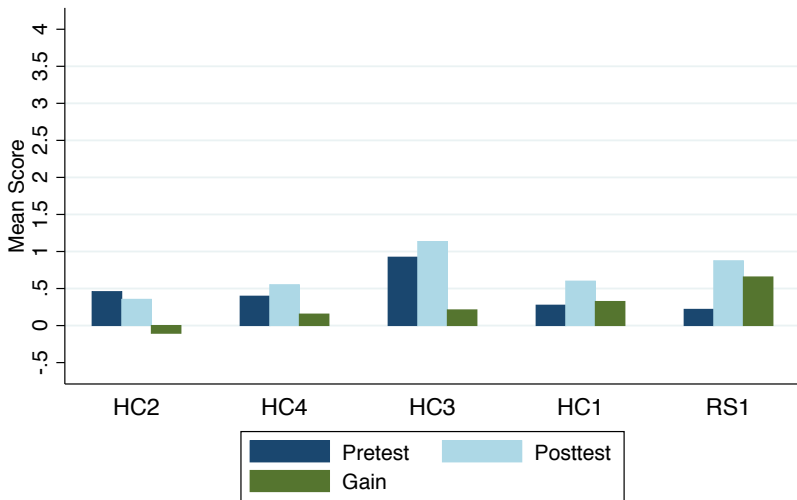
ThinkCERCA
Introduction



District/Teacher	Student N	Pretest	Posttest	Gain
HC2	24	0.88	0.69	-0.19
RS1	32	1.34	1.30	-0.05
HC4	29	0.62	1.05	0.43*
HC1	20	0.68	1.13	0.45
HC3	26	0.69	1.56	0.87***

* Significant at $p < 0.05$
 *** Significant at $p < 0.001$

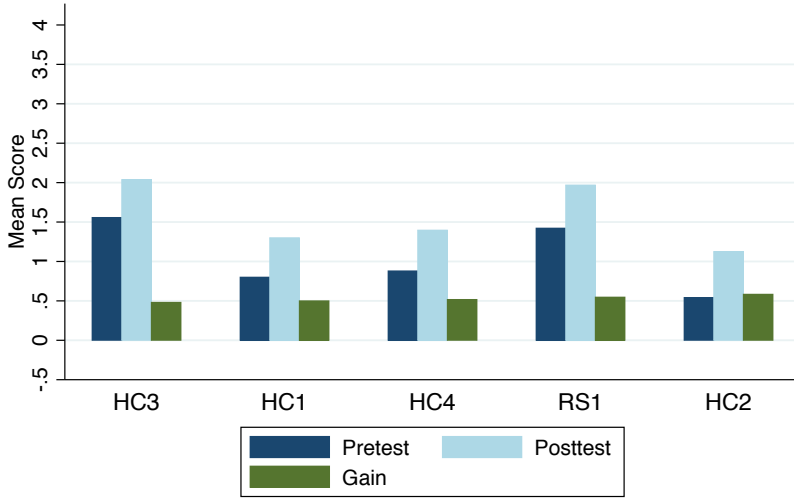
ThinkCERCA
Conclusion



District/Teacher	Student N	Pretest	Posttest	Gain
HC2	24	0.46	0.35	-0.10
HC4	29	0.40	0.55	0.16
HC3	26	0.92	1.13	0.21
HC1	20	0.28	0.60	0.33*
RS1	32	0.22	0.88	0.66***

* Significant at $p < 0.05$
 *** Significant at $p < 0.001$

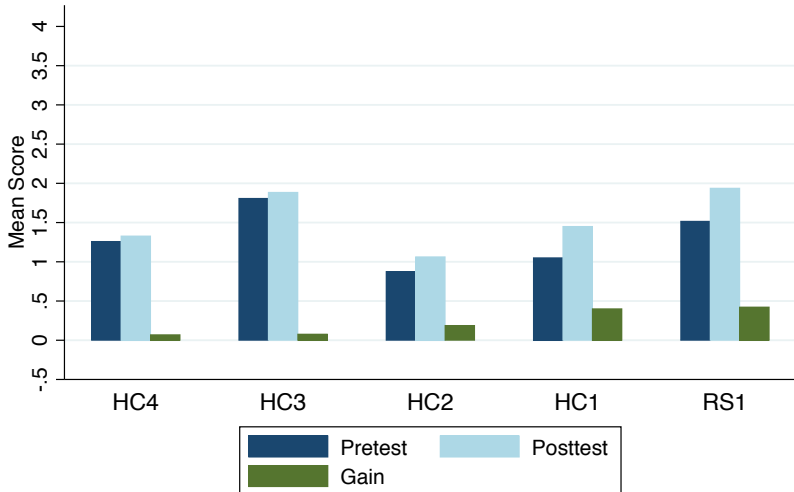
ThinkCERCA
Relevance



District/Teacher	Student N	Pretest	Posttest	Gain
RS1	32	1.42	1.97	0.55**
HC3	26	1.56	2.04	0.48
HC1	20	0.80	1.30	0.50*
HC4	29	0.88	1.40	0.52*
HC2	24	0.54	1.13	0.58*

* Significant at $p < 0.05$
** Significant at $p < 0.01$

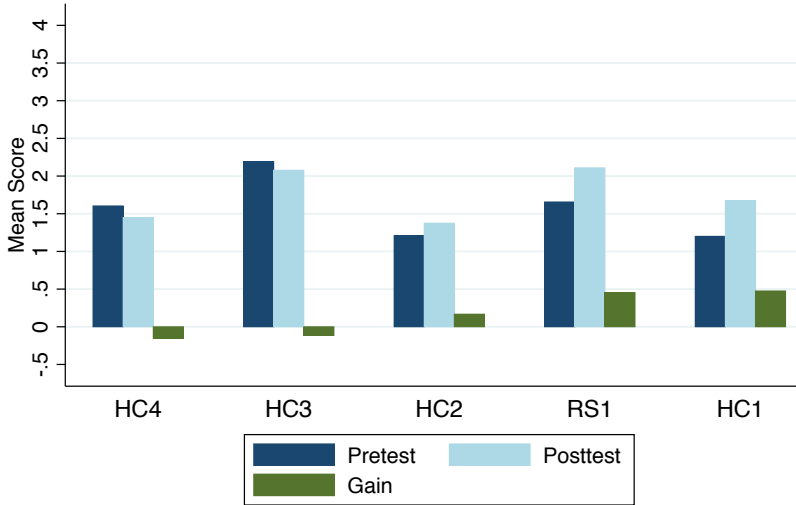
ThinkCERCA
Coherence



District/Teacher	Student N	Pretest	Posttest	Gain
HC4	29	1.26	1.33	0.07
HC3	26	1.81	1.88	0.08
HC2	24	0.88	1.06	0.19
HC1	20	1.05	1.45	0.40
RS1	32	1.52	1.94	0.42*

* Significant at $p < 0.05$

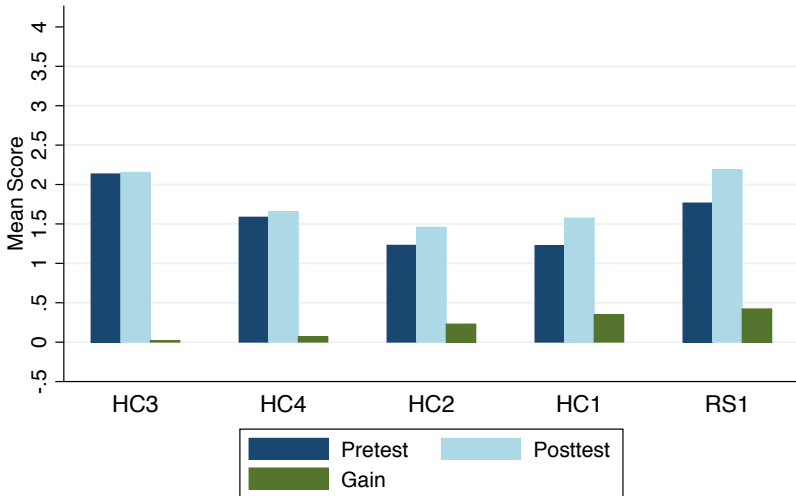
ThinkCERCA
Language



District/Teacher	Student N	Pretest	Posttest	Gain
HC4	29	1.60	1.45	-0.16
HC3	26	2.19	2.08	-0.12*
HC2	24	1.21	1.38	0.17
RS1	32	1.66	2.11	0.45
HC1	20	1.20	1.68	0.48*

* Significant at $p < 0.05$

ThinkCERCA
Conventions



District/Teacher	Student N	Pretest	Posttest	Gain
HC3	26	2.13	2.15	0.02
HC4	29	1.59	1.66	0.07
HC2	24	1.23	1.46	0.23
HC1	20	1.23	1.58	0.35
RS1	32	1.77	2.19	0.42*

* Significant at $p < 0.05$

Appendix D – Results of Impact Analysis

ThinkCERCA

Introduction										
	N	Mean Pretest	Mean Posttest	Pretest Std Dev	Posttest Std Dev	Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	1.34	1.30	1.06	1.11	-0.05	0.08	0.25	0.32	0.751
Comparison	52	1.41	1.29	1.07	0.95	-0.13				
Conclusion										
	N	Mean Pretest	Mean Posttest*	Pretest Std Dev	Posttest Std Dev	Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	0.22	0.88	0.49	0.84	0.66	0.51	0.21	2.46	0.016
Comparison	52	0.34	0.48	0.60	0.80	0.14				
Relevance										
	N	Mean Pretest	Mean Posttest	Pretest Std Dev	Posttest Std Dev	Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	1.42	1.97	0.74	0.63	0.55	0.49	0.20	2.44	0.017
Comparison	52	1.35	1.40	0.59	0.80	0.06				
Coherence										
	N	Mean Pretest	Mean Posttest	Pretest Std Dev	Posttest Std Dev	Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	1.52	1.94	0.64	0.81	0.42	0.37	0.18	2.1	0.04
Comparison	52	1.44	1.49	0.48	0.78	0.05				
Language										
	N	Mean Pretest	Mean Posttest**			Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	1.66	2.11	0.69	0.66	0.45	0.43	0.13	3.23	0.002
Comparison	52	1.70	1.71	0.60	0.71	0.01				
Conventions										
	N	Mean Pretest	Mean Posttest**			Mean Gain	Regression Coefficient	Std. Err.	t score	P> t
Pilot	32	1.77	2.19	0.88	0.74	0.42	0.44	0.16	2.7	0.008
Comparison	52	1.75	1.85	0.78	0.84	0.10				

Appendix E – Product Profile

Grantee Organization Name: ThinkCERCA
Product Name: ThinkCERCA
Curricular Focus: <ul style="list-style-type: none"> • Targeted subject(s): English Language Arts, Science, Social Science • Focus concept(s): critical thinking, argumentation, academic writing, close reading • Targeted grade(s): 4-12
Implementation: <ul style="list-style-type: none"> • Settings: Classroom, learning lab • Activity structure: Blended classrooms with self-paced learning • Infrastructure: Any web-based device with a tablet or larger screen size. • Time: 50-75 minutes/week
Overall product description: ThinkCERCA focuses on providing personalized critical thinking and argumentation support across the disciplines using leveled close reading instruction, argumentation tools, and writing rubrics. The CERCA in ThinkCERCA stands for “claim, evidence, reasoning, counterargument, audience”, which is the product’s (online) framework for scaffolding students’ argument creation after they have read articles from Science News for Kids, PBS, Smithsonian, the New York Times, and other major content partners, as well as excerpts from fiction. Students’ argumentation products take the form of extended writing, with scaffolded exercises and possibilities for revision. ThinkCERCA has a large lesson library that helps teachers differentiate readings and writing tasks, and also includes the option for teachers to create their own content.
Common Core State Standard Coverage: ThinkCERCA supports the writing standards, including conventions for written English. They provide tools and materials, practice opportunities, and, in some cases, direct instruction.

<i>Writing Standards Covered</i>	Types of Support for Standard		
	<i>Tools & Materials</i>	<i>Practice Opportunities</i>	<i>Direct Instruction</i>
Text Types and Purposes <i>Some standards covered (8/19)</i>			
CCSS.ELA-Literacy.W.6.1 Write arguments to support claims with clear reasons and relevant evidence.	✓	✓	✓
CCSS.ELA-Literacy.W.6.1a. Introduce claim(s) and organize the reasons and evidence clearly.	✓	✓	✓
CCSS.ELA-Literacy.W.6.1b Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.	✓	✓	✓
CCSS.ELA-Literacy.W.6.1c Use words,	✓	✓	

phrases, and clauses to clarify the relationships among claim(s) and reasons.			
CCSS.ELA-Literacy.W.6.1d Establish and maintain a formal style.		✓	
CCSS.ELA-Literacy.W.6.1e Provide a concluding statement or section that follows from the argument presented.	✓	✓	✓
CCSS.ELA-Literacy.W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.	✓	✓	✓
CCSS.ELA.Literacy.W.6.2c Use appropriate transitions to clarify the relationships among ideas and concepts.	✓	✓	✓
Production and Distribution of Writing <i>All standards covered (3/3)</i>			
CCSS.ELA.Literacy.W.6.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)	✓	✓	✓
CCSS.ELA.Literacy.W.6.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grade 6.)	✓	✓	✓
CCSS.ELA.Literacy.W.6.6 Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.	✓	✓	

Research to Build and Present Knowledge <i>Some standards covered (2/5)</i>			
CCSS.ELA-Literacy.W.6.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.	✓	✓	✓
CCSS.ELA-Literacy.W.6.9b Apply <i>grade 6 Reading standards</i> to literary nonfiction (e.g., “Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not”).	✓	✓	✓
Range of Writing <i>All standards covered (1/1)</i>			
CCSS.ELA-Literacy.W.6.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.	✓	✓	✓

<i>Language Standards Covered</i>	Types of Support for Standard		
	<i>Tools & Materials</i>	<i>Practice Opportunities</i>	<i>Direct Instruction</i>
Conventions of Standard English <i>Most standards covered (7/9)</i>			
CCSS.ELA-Literacy.L.6.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	✓	✓	✓
CCSS.ELA-Literacy.L.6.1a Ensure that pronouns are in the proper case (subjective, objective, possessive).	✓	✓	✓
CCSS.ELA-Literacy.L.6.1b Use intensive pronouns (e.g., myself, ourselves).	✓	✓	✓
CCSS.ELA-Literacy.L.6.1c Recognize and correct inappropriate shifts in pronoun number and person.	✓	✓	✓
CCSS.ELA-Literacy.L.6.1d Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous	✓	✓	✓

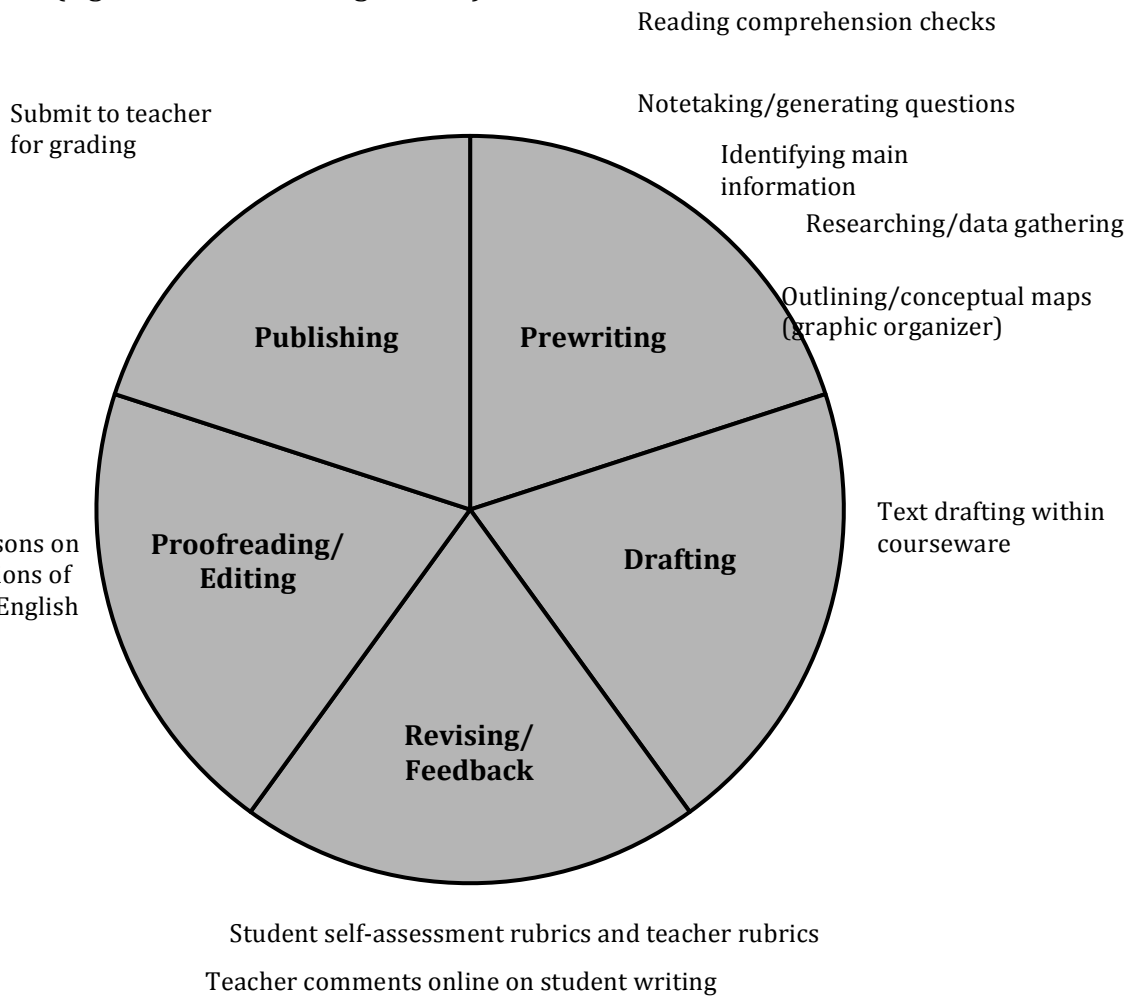
antecedents).			
CCSS.ELA-Literacy.L.6.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.			✓
CCSS.ELA-Literacy.L.6.2a Use punctuation (commas, parentheses, dashes) to set off nonrestrictive/parenthetical elements.			✓
Knowledge of Language <i>Some standards covered (1/3)</i>			
CCSS.ELA-Literacy.L.6.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.			✓

<i>Reading Standards Covered</i>	Types of Support for Standard		
	<i>Tools & Materials</i>	<i>Practice Opportunities</i>	<i>Direct Instruction</i>
Reading: Literature <i>Most standards covered (8/9)</i>			
CCSS.ELA-Literacy.RL.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	
CCSS.ELA-Literacy.RL.6.2 Determine a theme or central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.	✓	✓	
CCSS.ELA-Literacy.RL.6.3 Describe how a particular story's or drama's plot unfolds in a series of episodes as well as how the characters respond or change as the plot moves toward a resolution.	✓	✓	
CCSS.ELA-Literacy.RL.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone.	✓	✓	
CCSS.ELA-Literacy.RL.6.5 Analyze how	✓	✓	

a particular sentence, chapter, scene, or stanza fits into the overall structure of a text and contributes to the development of the theme, setting, or plot.			
CCSS.ELA-Literacy.RL.6.6 Explain how an author develops the point of view of the narrator or speaker in a text.	✓	✓	
CCSS.ELA-Literacy.RL.6.9 Compare and contrast texts in different forms or genres (e.g., stories and poems; historical novels and fantasy stories) in terms of their approaches to similar themes and topics.	✓	✓	✓
CCSS.ELA-Literacy.RL.6.10 By the end of the year, read and comprehend literature, including stories, dramas, and poems, in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	✓	✓	
Reading: Informational Text <i>Most standards covered (8/10)</i>			
CCSS.ELA-Literacy.RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.	✓	✓	
CCSS.ELA-Literacy.RI.6.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.	✓	✓	
CCSS.ELA-Literacy.RI.6.3 Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).	✓	✓	
CCSS.ELA-Literacy.RI.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.	✓	✓	
CCSS.ELA-Literacy.RI.6.6 Determine an author’s point of view or purpose in a text and explain how it is conveyed	✓	✓	

in the text.				
CCSS.ELA-Literacy.RI.6.8 Trace and evaluate the argument and specific claims in a text, distinguishing claims that are supported by reasons and evidence from claims that are not.	✓	✓		
CCSS.ELA-Literacy.RI.6.9 Compare and contrast one author’s presentation of events with that of another (e.g., a memoir written by and a biography on the same person).	✓	✓		
CCSS.ELA-Literacy.RI.6.10 By the end of the year, read and comprehend literary nonfiction in the grades 6–8 text complexity band proficiently, with scaffolding as needed at the high end of the range.	✓	✓		

Writing process support: ThinkCERCA provides support for many parts of the writing process, including prewriting, text drafting, revising/feedback, and publishing. They also provide mini lessons that support grammar (e.g., sentences, pronouns) as well as aspects of making arguments (e.g. claims, counterarguments).



Specific design features provided:

For Students:

- Topic overview that models conceptual vocabulary
- Leveled informational readings
- In-line vocabulary, audio, and image support, including pop-up definitions
- Highlighting tool in two colors with option to annotate highlights
- Sentence stems to support summarizing
- Tools for text drafting
- Rubrics for student self-assessment
- Interactive graphic organizer
- Argument builder with CERCA framework
- Flipbook style mini lessons that introduce CCSS skills
- Peer collaboration tool

For Teachers:

- Learning management system to assign lessons, grade, and manage workflow
- Lesson library with 3 lesson types: 1) close readings coupled with assessments, 2) mini lessons introducing key writing and argumentation skills, and 3) applied lessons with 10 levels of close reading and performance-based writing tasks
- Option for teachers to create own lessons in the system
- Grading rubrics for student writing
- Option for teachers to return to students without a grade (to allow multiple drafts)
- Option for teachers to assign a “growth focus” to students that tracks the writing areas they need more work on

Assessments:

- Automatically graded CCSS-aligned critical thinking and comprehension questions at end of texts within lessons
- Automated assessments for CCSS minilessons
- Rubrics for teachers to manually grade student writing assignments in the system

Reporting:

- Student-level and item-level analysis for all automated assessments
- Student achievement on writing and growth over time

Training and support for teachers: ThinkCERCA has developed and piloted a 3-hour professional development workshop for grade-level teams across the content areas. They also have resources on their website to help teachers open accounts, view student data and reports, and use different kinds of ThinkCERCA lessons.

Other notes about the product: N/A