Effects of a Quill.org Intervention on Paragraph Revision

Briana Chang, PhD, & Rory Lazowski, PhD
Procedure

The randomized control trial took place over the course of 11 weeks. During the first week, students signed up for the study, were randomized into either a treatment or control condition, completed demographic information, created their Quill.org accounts, and took all pretest measures. Pretest measures included 1) a paragraph revision task, 2) an SAT® Essay, and 3) a scale measuring writing motivation.

The intervention lasted four weeks during which students were asked to complete various activities according to their respective experimental conditions (described below). Students completed activities five days per week, Monday through Friday, and each practice activity took approximately 20 minutes. Thus, the intervention was four hours in total.

At the conclusion of the intervention, students were administered various posttest measures. Two posttest measures were administered at immediate posttest at the close of the intervention period: 1) the paragraph revision task and 2) an SAT Essay prompt. A delayed posttest was also administered two weeks following the conclusion of the intervention. At this time, students were asked to repeat the paragraph revision task and revise their posttest essay. A final two-month delayed posttest was administered where students were asked to repeat the paragraph revision task for the last time.

Research Questions

In this paper, we will present results for the paragraph revision task only. Separate papers are available for the SAT Essay prompt and motivation results.

In this study, we asked two research questions related to the paragraph revision task:

1. What is the effect of a Quill sentence-combining intervention on student writing as measured by a paragraph-level revision task?
2. If effects are present immediately following the intervention, are these effects sustained over time as measured by delayed posttests?

Experimental Conditions

Students were randomly assigned to either a treatment condition or a control condition:

1) **Treatment condition.** Students in the treatment condition practiced appositive phrases for the first week of intervention, followed by participial phrases the second week, and complex sentences the third week. For the final week of the intervention, students completed a daily mix of appositive phrases, relative clauses, and participial phrases activities.

2) **Control condition.** Students in the control condition were not assigned any sentence-combining skills practice using appositive phrases, participial phrases, or
complex sentences. Rather, they were assigned filler activities involving proofreading, punctuation, and grammar. These activities were thought to be educationally enriching, though not directly related to the outcomes in our study. However, just like students in the treatment condition, they practiced five times per week during the intervention weeks.

Outcomes and Measures

Sentence Combining Paragraph Revision Tasks. Sometimes referred to as whole-discourse exercises (Saddler, 2012), students were presented with multiple single-statement sentences comprising an original paragraph and were asked to combine the sentences, where it made sense, to make the paragraphs stronger. These original paragraphs were curated by Quill.org. Students were instructed to combine the sentences in a variety of ways and that the final paragraphs should have at least five sentences in total. Additionally, they were instructed that they could remove, add, or change words to combine sentences and that they should include all of the ideas from the original paragraph. Finally, students were instructed not to add any new ideas or information to their paragraphs.

Students completed the paragraph revision tasks on four separate occasions throughout the study: first at pretest, then three additional times at posttest. The first posttest administration occurred immediately following the intervention; the second occurred two weeks later, as a two-week delayed posttest; and finally, the third administration occurred two months after the intervention, as a two-month delayed posttest.

For each administration of the paragraph revision task, students completed six paragraphs. For the pretest, immediate posttest, and two-week delayed posttest, they were split into two sessions: three paragraph tasks on one day, three the following day. At the two-month delayed posttest, students completed all six paragraph tasks in one session.

Intervention and Practice Activities

All activities that students in the treatment and control conditions completed for the study were developed, assigned, and scored through Quill.org. Each of the practice skills that were used in the intervention are described below. All activities in the treatment conditions involved sentence-combining practice in the three skills (appositive phrases, participial phrases, and complex sentences). Each activity is estimated to take approximately 20 minutes to complete and were written at either a seventh-grade level (“Level 1”) or ninth-grade level (“Level 2”). In both Level 1 and Level 2 intervention activities, participants were presented with two simple sentences (“kernel sentences”) and asked to combine them into one sentence. Each skill is described below, along with an example of a sentence-combining item.

Appositive Phrases. Students in the treatment conditions were assigned to practice using appositive phrases. An appositive phrase is a noun phrase that renames or defines another noun or pronoun. Appositive phrases may be either restrictive (providing essential information for identifying the noun or pronoun it describes) or non-restrictive (providing
additional or non-essential information about the noun or pronoun it describes and set off from the rest of the sentence with commas).

**Example Level 1 Appositive Phrase prompt:**
Oolong has health benefits.
Oolong is a Chinese tea.

Example correct response: Oolong, a Chinese tea, has health benefits.

**Participial phrases.** Participial phrases are modifying phrases made up of a participle (like *running* or *hunted*) plus any objects or modifiers that finish the thought (*running across the field* or *hunted by bears*). Participial phrases may be either restrictive (providing essential information for identifying the part of the sentence it describes) or non-restrictive (providing additional or non-essential information and set off from the rest of the sentence with commas).

**Example Participial Phrases Prompt:**
The sauce began to smell fragrant.
The sauce was bubbling with the addition of new spices.

Example correct response: The sauce began to smell fragrant, bubbling with the addition of new spices.

**Complex sentences.** Complex sentences are sentences that consist of a dependent clause and an independent clause. An independent clause contains a subject and a verb and can stand alone as a sentence. A dependent clause, also known as a subordinate clause, begins with a subordinating conjunction and is not a complete sentence. A dependent clause (*Since I was cold*) needs to be attached to another idea (*I put on my jacket*) to have meaning. Complex sentences can show causal relationships (*because, since, if, unless*), sequence or time-order relationships (*as, when, after, before, while*), and relationships of contrast (*although, even though, though, while*).

**Example Complex Sentence Prompt:**
Most spiders are strictly solitary.
Some live together in large colonies of multiple webs.
Pick one: although, since, when

Example correct response: Although most spiders are strictly solitary, some live together in large colonies of multiple webs.
Sample

We targeted students who were older than 14 years old and whose parents previously provided consent for the current study. We then randomly assigned these students to either the treatment condition or the control condition. Students were compensated for completing the various activities in the study, including the pre- and posttests and all practice activities. Incentives were provided for each activity completed ($5 per 20-minute activity and test), in addition to a bonus of $15 for completing all portions of the study.

A total of 82 students (treatment n = 46, control n = 36) had complete data for the paragraph revision tasks at pretest, immediate posttest, two-week delayed posttest, and two-month delayed posttest.

Analytic Plan

We used multiple regression and compared the treatment to the control condition after controlling for any pretest differences based on the outcome of interest. We also calculated Cohen’s $d$, an effect size metric. An effect size provides an estimate of the magnitude of the difference and whether any differences between the treatment and control condition are substantively meaningful. Common interpretation guidelines for Cohen’s $d$ suggest that values of 0.20 are considered a small effect, 0.50 a medium effect, 0.80 a large effect.

Results

Effects on paragraph revision: Scoring for use of skills. After controlling for pretest differences, the treatment group scored significantly higher at immediate, two-week, and two-month posttest compared to the control condition (all $p$s < .05, Cohen’s $d$s > 0.80). The effect size estimates (Cohen’s $d$) suggested all comparisons were large in magnitude, suggesting the differences were substantively meaningful. Mean scores by condition at the time of measurement are presented in Figure 1.

To capture the typical growth we saw over the course of the intervention on the paragraph revision task, we provide pre- and posttest responses from selected students in the treatment condition. These are presented in the Appendix.
Conclusion

Overall, the Quill sentence-combining intervention was effective at improving student scores on combining sentences at the paragraph level at immediate, two-week, and two-month delayed posttests. The average effect of the intervention was considered large across all posttest time points. Thus, it was encouraging that benefits were sustained two months following the intervention for the treatment group. These results extend previous findings where we found large, positive effects for a sentence-combining intervention focusing on only one skill and on a less demanding task (e.g., only combining two kernel sentences instead of a paragraph).

While the paragraph revision results are promising, this task is still quite similar to the intervention and does not reflect transfer of the sentence-combining skills to students’ own writing. The paragraph revision task is far simpler (and much more proximal to the intervention) than an outcome such as original paragraph writing, or writing and revising a full SAT Essay. As noted earlier, we have collected and analyzed data on these outcomes and the results are presented in other papers.

Future studies will examine the impact of a potentially stronger intervention—one that is longer in duration and/or one that also incorporates more comprehensive instructional content related to the benefits of sentence combining and when to effectively use these skills, not just how to combine sentences using different skills.
References

Appendix

Key:

Appositive phrases

Participial phrases

Complex sentences

Student 1:

Original Paragraph

Wilbur and Orville Wright's father often brought back toys for his children from his journeys. Wilbur and Orville's father was a traveling preacher. Their father gave them a small model helicopter. Their father was sparking their lifelong interest in flight. The model helicopter broke. They decided to make their own. As adults, the brothers headed to the windy town of Kitty Hawk, North Carolina. They were hoping to develop their own successful plane there. The brothers were emulating how birds angled their wings for control. The brothers eventually came up with "wing warping." "Wing warping" was an early system for controlling an aircraft's wings. In 1903, Wilbur and Orville Wright achieved the first powered and controlled airplane flight. Wilbur and Orville Wright were changing the world forever.

Pretest Response

Wilbur and Orville Wright's father often brought back toys for his children from his journeys as a traveling preacher. Their father was sparking their lifelong interest in flight when he gave them a small model helicopter. The model helicopter broke so they decided to make it their own. As adults, the brothers headed to the windy town of Kitty Hawk, North Carolina, because they were hoping to develop their own successful plane there. The Brothers were emulating how birds angled their wings for control, and eventually came up with "wing warping". "Wing warping" was an early system for controlling an aircraft's wings. In 1903, Wilbur and Orville Wright achieved the first powered and controlled airplane flight, and they were changing the world forever.

Posttest Response

Wilbur and Orville Wright's father, a traveling preacher, often brought back toys for his children from his journeys. Their father gave them a small model helicopter, sparking their lifelong interest in flight. Since the model helicopter broke, they decided to make their own. As adults, the brother headed to the windy town of Kitty Hawk, North Carolina, hoping to develop their own successful plane there. The brothers eventually came up with "wing warping", an early system for controlling an aircraft's wings. In 1903, Wilbur and Orville Wright achieved the first powered and controlled airplane flight, changing the world forever.
Student 2:

Original Paragraph

Franklin D. Roosevelt became president during the Great Depression. The Great Depression was the worst economic collapse in the history of the industrialized world. In 1933, Roosevelt enacted the New Deal. The New Deal was a federal program of economic relief and reforms. Roosevelt believed that he needed to communicate with the American people to make the program successful. Roosevelt began giving fireside chats. The fireside chats were a series of informal radio talks. The term “fireside chat” was inspired by Stephen Early. Stephen Early was Roosevelt’s press secretary. The first chat focused on the Banking Crisis. The Banking Crisis was a nationwide panic over the banking system. The chats were initially created to build support for the New Deal. The chats ended up doing much more. They gave Americans hope in a time of despair.

Pretest Response

The Great Depression was the worst economic collapse in the history of the industrialized world. During this time Franklin D Roosevelt became president, and in 1933 enacted the New Deal. The New Deal was a federal program of economic relief and reforms. Roosevelt believed that he needed to communicate with the American people to make the program successful. Therefore, he began giving fireside chats, which were a series of informal radio talks. The term “fireside chats” was inspired by Stephan Early, who was Roosevelt’s press secretary. The chats were initially created to build support for the New Deal, and they ended up doing much more. They gave Americans hope in a time of despair. The first fireside chat was focused on the Banking Crisis. The Banking Crisis was a nationwide panic over the banking system.

Posttest Response

During the Great Depression, the worst economic collapse in the history of the industrialized world, Franklin D Roosevelt became president. In 1933, he enacted the New Deal, a federal program of economic relief and reforms. Since he believed that he needed to communicate with the American people to make the program successful, Roosevelt began giving fireside chats, a series of informal radio talks. The term “fireside chat” was inspired by Stephen Early, Roosevelt’s press secretary. The first chat focused on the Banking Crisis, a nationwide panic over the banking system. The chats were initially created to build support for the New Deal but ended up doing much more, they gave Americans hope in a time of despair.

Student 3:

Original Paragraph

Plants do not need people to give them food. They can make their own food. The food-making process for plants happens throughout the course of the day. This food-making process is called photosynthesis. Plants need water, sunlight, and carbon dioxide in order to produce glucose. Glucose is a simple sugar that helps plants grow and live. Some glucose is used immediately to help the plant grow. Additional glucose is stored in leaves, roots, or fruits. This ensures that the plant will remain nourished in the future. Some water is lost during this process. This is not a problem for most plants.
Some plants are more challenging to care for than others. They need precise amounts of sunlight and water to survive and thrive.

Pretest Response

Plants don’t need people to give them food, they can make their own. The process of food-making for plants, called photosynthesis, happens throughout the day. Plants need water, sunlight, and carbon dioxide to produce glucose, which is a simple sugar that helps plants grow and live. Some glucose is used immediately to help the plant grow, extra glucose is stored in leaves, roots, or fruits. This ensures that the plant will remain nourished in the future. Some water is lost during this process, this isn’t a problem for most plants, but some plants are more challenging to care for than for others. They need precise amounts of sunlight and water to survive and thrive.

Posttest Response

Plants do not need people to give them food, they can make it on their own. The food-making process, called photosynthesis, happens throughout the course of the day. Plants need water, sunlight, and carbon dioxide to produce glucose, a simple sugar that helps plants grow and live. While some glucose is used immediately to help the plant grow, additional glucose is stored in leaves, roots, or fruits. This ensures that the plant will remain nourished in the future. Some water is lost during this process, but this isn’t a problem for most plants. Some plants are more challenging to care for than others, needing precise amounts of sunlight and water to survive and thrive.

Student 4:

Original Paragraph

Eleanor Roosevelt became the First Lady of the United States in 1933. Eleanor Roosevelt was the wife of Franklin D. Roosevelt. Eleanor reshaped the role of first lady. She was doing much more than hosting parties and entertaining leaders. Eleanor traveled the country. Eleanor was hoping to talk to people who were hurt by the Great Depression. She was armed with this experience. She helped the president understand the importance of serving women and minorities. Eleanor supported women’s rights. Eleanor was reserving some press conferences just for female reporters. Eleanor was recognized for her humanitarian efforts. Eleanor promoted human rights across the country and world.

Pretest Response

Eleanor Roosevelt was the wife of Franklin D Roosevelt and became the First Lady of the United States in 1933. She would reshape the role of the First Lady. As Eleanor traveled the country, she was hoping to talk to people who were hurt by the Great Depression and became armed with experience. She helped the President understand the importance of serving women and minorities as a supporter of women’s rights. Also, she would reserve some press conferences just for female reporters. Eleanor promoted human rights across the country and world and was recognized for her humanitarian efforts.

Posttest Response
Eleanor Roosevelt, the wife of Franklin D Roosevelt, became the First Lady of the United States in 1933. Doing much more than hosting parties and entertaining leaders, Eleanor reshaped the role of First Lady. Eleanor traveled the country, hoping to talk to people who were hurt by the Great Depression. Armed with this experience, she helped the president understand the importance of serving women and minorities. Supporting women’s rights, Eleanor reserved some press conferences just for female reporters. Eleanor was recognized for her humanitarian efforts and promoted human rights across the country and world.

Student 5:

Original Paragraph

The Sons of Liberty formed in response to the Stamp Act of 1765. The Sons of Liberty was a secret political organization. The Stamp Act of 1765 taxed the British colonies in America. The Stamp Act of 1765 was triggering a firestorm of opposition. The organization was started in Boston and New York. The organization soon expanded throughout the colonies. Samuel Adams founded the group. Samuel Adams was an American statesman. The Sons of Liberty could not meet in public. The Sons of Liberty would have been punished for treason. Treason is the crime of betraying one’s country. The Sons of Liberty protested violently. The protests were against British laws like the Tea Act of 1773. The Tea Act of 1773 led to the group’s most famous demonstration. The group’s most famous demonstration was the Boston Tea Party. The Sons of Liberty played a major role in sparking the American Revolution. The American Revolution was one of the most significant events in United States history.

Pretest Response

The Sons of Liberty was a secret political organization and they had a response to the Stamp Act of 1765. The Stamp Act of 1765 taxed the British colonies in America. This Stamp Act had a lot of opposition. The organization soon expanded through the colonies, after starting in Boston and New York, thanks to the founder Samuel Adams. Samuel Adams was an American statesman. The organization could not meet in public because they could be punished for treason, which is the crime of betraying one’s country. The Sons of Liberty protested a lot and some of their protests were about things like the Tea Act 1773, which led to their most famous demonstration of the Boston Tea Party. They played a role in sparking the American Revolution, which was one of the most significant events in US history.

Posttest Response

A secret political organization, The Sons Of Liberty, was formed in response to the Stamp Act of 1765. The Stamp Act of 1765 taxed the British colonies in America, triggering a firestorm of opposition. Samuel Adams, an American statesman, founded the group that soon expanded throughout the colonies. Because they would have been punished for treason, the Sons of Liberty could not meet in public. Treason is the crime of betraying one’s country. The protests were against British laws like the Tea Act of 1773, which led to their most famous demonstration. Their most famous demonstration was the Boston Tea Party, playing a major role in sparking the American Revolution, which was one of the most significant events in United States history.

Student 6:
Hurricane Katrina is considered one of the worst storms in United States history. Hurricane Katrina took many lives and destroyed a great deal of property. People were ordered to evacuate New Orleans. Many were not able to leave in time. New Orleans was not hit directly by Katrina’s winds. The storm’s aftermath was disastrous for the city. New Orleans is a low-lying city. New Orleans was already likely to flood before the hurricane. The city had levees to protect against high water levels. Most of the levees failed. 80 percent of New Orleans flooded. The National Guard was called in to help. People needed to be rescued from flooded areas.

Pretest Response

Hurricane Katrina is considered one of the worst storms in United States history. It took many lives and destroyed a great deal of property. In New Orleans, people were ordered to evacuate; however, many were not able to leave in time. The storm’s aftermath was disastrous. New Orleans is a low-lying city, so it was already likely to flood before the hurricane. The city even had levees to protect against high water levels, but most of them failed. 80 percent of New Orleans flooded. The National Guard was called in to help because people need to be rescued from flooded areas.

Posttest Response

Hurricane Katrina, taking many lives and destroying a great deal of property, is considered one of the worst storms in United States history. People were ordered to evacuate New Orleans, but many were not able to leave in time. Although New Orleans was not hit directly by Katrina’s winds, the storm’s aftermath was disastrous for the city. Since New Orleans is a low-lying city, it was already likely to flood before the hurricane. Although the city had levees to protect against high water levels, most of the levees failed, and 80 percent of New Orleans flooded. Since people needed to be rescued from flooded areas, the National Guard was called in to help.
About College Board

College Board reaches more than 7 million students a year, helping them navigate the path from high school to college and career. Our not-for-profit membership organization was founded more than 120 years ago. We pioneered programs like the SAT® and AP® to expand opportunities for students and help them develop the skills they need. Our BigFuture® program helps students plan for college, pay for college, and explore careers. Learn more at cb.org.