

THE EFFECTIVENESS OF USING NGSS CLAIM, EVIDENCE, AND REASONING TO
IMPROVE ANALYTICAL WRITING IN ELEMENTARY LITERACY

by

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ABSTRACT

This action research study explored the effects of using a Claim, Evidence, and Reasoning (CER) framework to help fourth-grade students apply analytical reasoning to their writing. The CER framework was originally developed to help students improve the strength of their written claims in the science classroom by providing reasoning that connects their evidence to their claim. While CER has been shown to be an effective instructional approach to writing in scientific contexts and environments, little research has been undertaken to determine if CER has applications beyond the science classroom. Historically, fourth-graders at Olympic View Elementary School have struggled with analytical writing on both in-class assessments and on end-of-year standardized exams. This study sought to determine if a more structured writing approach like CER, could be effective in helping fourth-grade students at Olympic View Elementary School connect textual evidence with their claims when writing answers to reading comprehension questions. The study took place over an eight week period and included 65 students from three, fourth-grade ELA classrooms. The pre-treatment period of the study consisted of students taking a writing assessment, a Likert-style writing confidence survey, and answering comprehension questions from the first four chapters of the novel *Because of Winn Dixie*. During a two week treatment students were introduced to the CER framework and practiced using it with support from the teacher. Following the treatment students answered comprehension questions from the next four chapters of the novel, retook both the writing assessment and the writing confidence survey, and participated in student interview sessions. Student writing was scored using a rubric, and further analyzed to determine if student writing improved. Data from the pre- and post-treatment writing assessments was compared using a paired t-test, and analyzed to determine normalized gains. Student responses to the writing confidence surveys were compared to assess the change in student confidence. The results from the study indicated that students had made statistically significant improvements in their written answers, and indicated an increase in student confidence. These findings suggest that the CER framework can be an effective in helping young students apply analytical reasoning to their writing.

INTRODUCTION AND BACKGROUND

Context of the Study

I teach English Language Arts (ELA) to three fourth-grade classes at Olympic View Elementary School (OVE) in Oak Harbor, Washington. My school currently serves 406 students in grades kindergarten through fourth grade. Fifty-two percent of OVE students qualify for free or reduced lunch, which qualifies OVE to receive school-wide Title I reading services. Thirty percent of students at OVE qualify for special education services. These special education services include programs to support students with emotional and behavioral disorders, as well as one primary and one intermediate Life Skills classroom. Seven percent of students at OVE qualify for Multilingual Learner services, and less than 1% qualify for highly capable services. Thirty-one percent of students at OVE are students of color, and over 60% have one or more parents serving at Naval Air Station Whidbey (S. Lucero, personal communication, March 21, 2024).

Like most elementary schools OVE is made up of a diverse population of learners with a vast variety of needs. While this in itself presents challenges, these challenges are exacerbated by the fact that our population is also highly transient. Due to the transient nature of military life, I rarely have fourth graders in my class who started as kindergarteners at OVE.

Three years ago the Oak Harbor School District adopted the Core Knowledge Language Arts (CKLA) literacy curriculum. The CKLA curriculum is designed to teach literacy through a combination of knowledge and skill building that is taught in a linear fashion from kindergarten through fifth grade. It is a learning model based on the assumption that students entering the

fourth grade will have accumulated the four years of background knowledge and accompanying hierarchy of intertwined reading and writing skills necessary to successfully engage with the curriculum as fourth graders. What I have found in my classroom is quite the opposite. For many of my students my classroom marks their first introduction to the curriculum, and for others, it is often only their second or third year with the curriculum. This lack of a continuous learning continuum is evident in the knowledge and skill gaps my students come to me with.

In an effort to mitigate these learning gaps, OVE is shifting away from teaching CKLA with fidelity, and towards a standards-based model of instruction and assessment that allows teachers to utilize the CKLA curriculum readers and source material while explicitly teaching reading and writing skills. This shift is intended to minimize the learning gaps that occur with a curriculum that relies on learning through osmosis, or an exposure-based instructional approach to knowledge and skills acquisition, and in particular for a transient group of students who may or may not be there to receive that instruction. These gaps are especially evident in my fourth grader's writing capabilities. Many of my students start the year without the necessary skills to write a coherent paragraph, let alone possess the skills necessary to undertake the larger pieces of narrative, opinion, or expository writing that they will be assessed on at the end of the school year. The absence of these skills among my students has ultimately lead to a shift in my instructional approach to writing.

Over the past decade I have utilized a number of programs and approaches to teaching writing. As might be expected, all of them had their areas of strengths and weaknesses. While one program might have a particularly strong approach to teaching narrative writing, the informational or opinion writing component would be lacking. Ultimately, I gave up on the one-

size-fits-all approach and instead tried to sift out and use what was best from each program. For the most part this had worked well, with one notable exception. I did not have an effective method for helping my students develop their skills in applying analytical reasoning to their writing, but I did have an idea. I wanted to explore the notion of students sharing their understanding through an approach called Claim, Evidence, and Reasoning (CER).

The CER framework have been used with success in science education (Fleming et al., 2022). They help scaffold the thinking process for young students by providing a structure to the process. These frameworks help students move beyond merely giving evidence to support a scientific claim, to providing reasoning as to why their evidence is good evidence. If this framework can help young students improve the strength of their scientific claims through analytical reasoning, could it also be utilized to help my fourth graders improve their analytical reasoning skills in their writing? Every year in my classroom my students read the novel, *Because of Winn Dixie* as part of a novel study. The focus of my research is determining if my students could use strategies from the CER framework to improve their ability to apply analytical reasoning to their written answers to comprehension questions from the book.

Focus Question

The focus question of this study was, What are the effects of using the Claim, Evidence, and Reasoning framework (CER) on elementary students' ability to apply analytical reasoning to their written answers to comprehension questions in literacy?

CONCEPTUAL FRAMEWORK

The Writing Problem

The first step in solving any problem is first admitting that there is a problem. Fourth-grade elementary students in Washington State have opportunities to improve their writing proficiency. English Language Arts (ELA) Smarter Balance summative exam results for fourth graders in the state of Washington for the 2018-2019 school year showed that 56.9% of students met the ELA proficiency standards to stay on track for college-level learning. Results from the 2023-2024 school year indicated that 48.5% of fourth-grade students met ELA standards, a drop of more than 8% over a five year period (OSPI Report Card, 2024). National indicators echo those results. The 2022 National Assessment of Educational Progress (NAEP) test results for 9-year-old students showed the lowest reading and math scores in over 20 years with 33% scoring as proficient or above. (NAEP, 2022). While students in Washington State are currently scoring above the national average, their scores are trending in the wrong direction.

Test score data also suggests that low scores indicate a new downward trend in student achievement. A recent study by the Northwest Evaluation Association (NWEA) showed that students in the third through eighth grades, across all fifty states and the District of Columbia, were making slower progress than their peers did before the COVID-19 pandemic (Lewis et al., 2022). Progress for economically disadvantaged students and students of color has been impacted even more profoundly with achievement gaps widening, not shrinking (Kuhfeld et al., 2022). According to a study by the Annenberg Institute for School Reform at Brown University, school districts across the globe have put in place a variety of interventions that include increasing the length of both the school day and school year, increasing the availability of

tutoring resources, and providing targeted small-group instruction to overcome these deficits (Annenberg Institute, 2024). Despite these interventions, progress towards overcoming these achievement deficits has been slow. A study by the Center on Reinventing Public Education found that the average student has recovered roughly a quarter of the learning that was lost during the pandemic. (CRPE, 2024) A bright spot in all of this is a renewed focus on utilizing evidence-based instructional methodologies and professional development to help educators better address the needs of students (Pearson, 2022).

Evidence-Based Learning: A Paradigm Shift

A shift towards evidence-based teaching and learning in the United States was evident with the introduction and adoption of the English Language Arts ELA and Math Common Core State Standards in 2010 (CCSS). By the end of the year, most states had adopted the new standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2021). In 2011 the Next Generation Science Standards (NGSS) were introduced, and for the first time in history, the United States had widely adopted standards for ELA, math, and science that were designed to help students become college and career-ready. With the new standards came requirements that asked young students to support evidence-based claims in writing with higher level analytical reasoning. Educators soon realized that many students lacked the necessary reading and writing skills to formulate those claims (Anderson et al., 2017). Writing was at one time relegated to second-tier status in the hierarchy of necessary learning behind reading and math, and it was moving to the forefront with instructional practices based on highly-researched writing interventions (Graham, 2021).

As early adopters began working with the new standards, it became clear that there was a natural integration between the two sets of standards. One group of early implementers of NGSS took part in an initiative that sought to integrate science and ELA in kindergarten through eighth grade classrooms. The Early Implementers Initiative involved eight school districts in California and spanned four years from 2014 to 2020 (Tyler et al., 2020). Participants in the study utilized constructivist teaching methods to promote critical thinking and writing skills. The results of the study demonstrated evidence of strong student engagement and learning in both ELA Common Core State Standards and NGSS, through content integration. (Tyler et al., 2020).

Educators have long looked to Bloom's 1956 taxonomy as a standard framework for categorizing educational outcomes (Bloom, 1956). The framework was designed as a lower-order to higher-order hierarchy of knowledge and skills that students apply to their work. The six original categories were: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The taxonomy was updated in 2001 with new categories and the new title, *Taxonomy for Teaching, Learning, and Assessment*. The categories were changed to: Remember, Understand, Apply, Analyze, Evaluate, and Create. This change in categories was intended to better reflect the dynamic nature of the cognitive processes that learners undertake (Armstrong, 2010) (Figure 1).

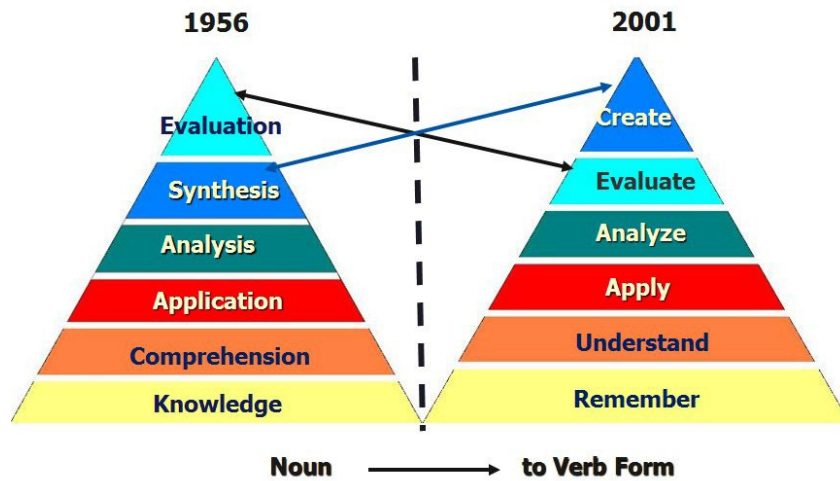


Figure 1. Bloom's Taxonomy Revised (Wilson, 2001).

While the 2001 update did address some of the perceived shortcomings of the framework, some scholars feel that the framework still falls short in addressing the current learning needs of students. They point to the lack of empirical validation behind the framework, and in the way that Bloom's framework fails to address the very nature of cognitive development by presuming that thinking occurs in, and can be categorized into distinct hierarchies (Stella-Kompa, 2021). Perhaps the greatest criticism directed at Bloom's Taxonomy is that the hierarchal nature of the framework does not consider the synchronous, multifaceted process of learning. In real-world scenarios, the application of knowledge and thinking does not occur in cumulative succession, but instead happens in a dynamic, simultaneous, and integrative fashion (Ali Soozandehfar & Reza Adeli, 2016). The willingness of educational researchers to re-evaluate and move beyond Blooms' Taxonomy is significant because it represents a move towards learning frameworks that are evidence-based.

New Frameworks for Learning

The American psychologist and education reformer John Dewey (1916) once said, "If we teach today's students as we taught yesterday's, we rob them of tomorrow" (p. 167). Dewey's quote from over a century ago still holds true today. Current education reformers echo that same thought by suggesting the move towards curricula addresses changing social and environmental complexities as a natural evolution in curriculum design (Plate, 2012).

This shift towards authentic, integrated learning can be seen in many of the teaching and learning frameworks currently being used in classrooms ranging from preschool to the college level. All of these frameworks are rooted in constructivist learning theory; a student-centered approach to learning where students are building meaning through exploration, questioning, collaborating, and reflecting (Bada & Olusegun, 2015). This is in contrast to traditional learning approaches where students are largely passive participants in the learning process. One such framework is Universal Design for Learning. Universal Design for Learning, or UDL, is a framework that utilizes a scientific approach that is based on neuroscience and evidence-based practices that promotes student agency and accessibility through multiple means of student engagement, representation, and expression (CAST, 2024). Another framework currently being used is Problem-Based Learning (PBL). With PBL, students learn by working together in groups to solve real-world, meaningful problems (Nilson 2010). A third framework that utilizes this same constructivist approach is the 5E model. The 5E model is a cycle of inquiry that consists of five distinct phases where students engage, explore, explain, elaborate, and evaluate (Duran & Duran, 204). Like PBL, the 5E model encourages student collaboration, inquiry, and critical thinking. Claim, Evidence, and Reasoning (CER) is another constructivist approach to learning.

With the CER framework students first state a claim or answer to a scientific question. Next, they provide evidence to support their claim, and finally, they provide reasoning that explains why their evidence supports their initial claim (McNeill & Krajcik, 2011). All of these frameworks represents a move towards, or return to, more authentic student-centered learning that focuses on students' ideas and thinking. The student-centered classroom is a constructive learning environment that is a synthesis of student motivation, best practices, and collaboration, all connected to the student's prior knowledge and experiences (McCombs & Whisler, 1997).

Claim, Evidence, and Reasoning as a Writing Framework

Claim, Evidence, and Reasoning (CER) has been shown to be an effective teaching framework for argumentative writing in a variety of classroom environments (Fleming et al., 2022). The CER framework was originally developed to support middle grade science teachers (McNeill & Krajcik, 2011). Since then, the application for CER has broadened and it has been used effectively for students in the elementary grades (McNeill, 2011). Platt (2020) demonstrated that using a CER framework in the ELA classroom helped improve argumentative writing in science and across other content areas. The study evaluated pre- and post-treatment student writing samples using a rubric to measure skill growth. The results showed that using CER in the ELA classroom bolstered student confidence and increased the frequency of well-reasoned arguments in student writing samples (Platt, 2020).

The National Science Teaching Association's (NSTA) journal, *Science and Children* describes a study documenting the use of Scaffolding Student Explanations (SSE) handouts to assist students in formulating written arguments using a Claim, Evidence, and Reasoning (CER) instructional model. The SSE handout was successful in helping students organize their ideas in

prewriting. This allowed teachers to see evidence of student thinking, and it helped the students transition from using the graphic organizers to moving to narrative writing (Fleming et al., 2022).

Evidence of explicit writing instruction using the CER framework supports what educators know about best practices in writing, and in particular argumentative writing. Best practices in writing instruction include writing frequently, writing across multiple content areas, writing for different purposes and audiences, writing in ways that demonstrate a unique perspective, and writing about a single topic for extended periods of time (Graham et al., 2019).

One area that would benefit from additional research is argumentative writing interventions at the elementary level. Arguing comes naturally to young children. Argumentative discourse serves as one of the first means for young children to demonstrate their feelings and ideas and to provide reasoning for their decision-making. As children develop they become more sophisticated in their arguments, but their arguments tend to have a self-serving, my-side bias (Graham et al., 2019). This bias is also reflected in their argumentative writing which often reflects poorly reasoned arguments that lack consideration for alternative perspectives. As reading and writing across content areas become more intertwined throughout curriculum and standards, the need for research into argumentative writing interventions that demonstrate the ability to improve the quality of students' argumentative writing has become paramount (Ferretti & Graham, 2019).

Research has shown young students can formulate evidence-based, reasoned arguments in their writing, but still demonstrate confusion between both evidence and reasoning, and claim and evidence (Yamamoto et al., 2022). A writing intervention that provides more structure for

students could serve as a means to help students present their arguments in writing more effectively. Claim, Evidence, Reasoning as a writing framework utilizes a structured approach, incorporates student-centered learning, and incorporates best practices for writing instruction (Graham et al., 2007)

METHODOLOGY

Demographics

The subjects of the study were 65 students from three, fourth-grade English Language Arts (ELA) classes at Olympic View Elementary School during the 2024-2025 school year. The first class of 22 students was comprised of 64% male students and 36% female students. In this class, 27% of the students had an Individual Education Plan (IEP), 19% were identified as gifted, 14% had a 504 plan, and 13% of students received Multilingual Learner (MLL) services. The second class was comprised of 19 students, of which 74% were male and 26% were female. Thirty-seven percent of students in this class had IEPs, and 21% of students were identified as gifted. The final class was my homeroom class and was the largest at 24 students. Fifty-eight percent of the students in this class were male, and 42% were female. Twenty-nine percent of students had an IEP, 17% received MLL services, 8% had a 504 plan, and a final 8% were identified as gifted (S. Lucero, personal communication, October 9, 2024). The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for work with human subjects was maintained (Appendix A).

Treatment

The purpose of this study was to explore the effectiveness of using a Claim, Evidence, and Reasoning (CER) framework to help fourth-grade students apply analytical reasoning skills to comprehension questions in literature. Over the last 14 years, the fourth-grade teachers at my

school have tried numerous writing interventions to help our students support their written answers in literacy with textual evidence and analytical reasoning. To date, none of the interventions we have tried have been overtly successful as measured by in-class and end-of-year writing assessments, nor have they followed a data-driven, action research process. As a result, we have been left with little actionable data that we can use to help our students improve. This lack of data is what served as the impetus for undertaking this study.

I conducted my research during the second trimester of the 2024-2025 school year. The study period covered nine weeks, starting in late January and ending in late March.

During the first half of January, prior to the treatment, students answered two short answer reading comprehension questions from each of the first four chapters of the novel *Because of Winn Dixie*. I read the novel aloud in class and students had access to a physical copy of the novel while they crafted their responses. During this two week time period, students were also given a standalone reading comprehension assessment consisting of a single paragraph and two related, short-answer comprehension questions. Both of these pre-assessments were scored with the same rubric and would serve to create a baseline prior to the writing intervention. Following the two initial assessments, students were given a survey to rate their level of confidence in writing short-answer responses to reading comprehension questions.

In late January, the students in all three classes received explicit instruction on the CER writing framework over the course of two weeks. During the first week the students were introduced to the concept of CER and participated in a teacher-modeled activity that asked them to make a claim as to who was responsible for killing the cat in a Doritos commercial. The students utilized a teacher-created, scaffolded graphic organizer that had them state a claim,

provide evidence from the video to support their claim, and provide reasoning as to why their evidence was good evidence. Students then used the information in the graphic organizer to rewrite their answers in a short answer format. Once completed, a short discussion followed in which I introduced the students to the scoring rubric I would be using, and how their responses would be scored. During the second week of instruction, students participated in a similar CER activity that asked them to decide if the theory of continental drift was true, based on information they read in a short text. Once again, students used graphic organizers to support their claims, and utilized the information from the graphic organizers to rewrite and self-assess their work. As before, I utilized the same rubric to maintain consistency in my scoring of the writing.

Data Collection and Analysis Strategies

Following the treatment period I had my students answer the Because of Winn Dixie CER Questions for chapters five through eight (Appendix B). The students wrote their responses over a two week period, and were scored using the Claim, Evidence, and Reasoning Rubric (Appendix C). This same rubric was used to score student responses prior to the treatment. Student responses for each question were scored for each of the elements of claim, evidence, and reasoning. Evidence of analytical reasoning would include a clear explanation connecting the claim and evidence, and showing a good understanding of the text. Each element was evaluated on a scale of one to four, with a score of four indicating an exemplary answer, a score of three indicating a proficient answer, a score of two representing a basic answer, and a score of one indicating an answer that needs improvement. For each question, there were a total of 12 possible points. When all scores had been tabulated, they were compared to the pre-assessment scores for chapters one through four to determine normalized gains (Hake, 1998).

While the students were working independently to answer the comprehension questions, I spent a portion of each class period making observations using the Student Writing Checklist (Appendix D). The checklist allowed me to make observations in the areas of Student Behavior, Use of CER, Writing Conventions, and Task Completion. By taking observations both pre- and post-treatment, the observations would help me determine if the writing intervention resulted in a change in my students' ability to effectively apply analytical reasoning to their writing. I used the checklist to record whether the checklist items were observed or not observed, and to take any notes relevant to what I was observing. Information from the checklist would be used to identify patterns and themes in the students' work and behavior.

The final assessment the students took was the CER Writing Assessment (Appendix E). This is the same assessment that the students took in January prior to the treatment. Unlike the chapter questions from the novel which differed due to the changing content of the story, this assessment contained the same single paragraph and accompanying two questions as the pre-assessment, and would be scored using the Claim, Evidence, and Reasoning Rubric. Scores from the two assessments were analyzed using a paired t-test.

When the assessments were completed, the students retook the Written Response Confidence Survey to determine their level of confidence with regard to writing short answer explanations (Appendix F). The twelve question survey had students rate their level of confidence using a scale of Strongly Agree (1), Agree (2), Neutral (3), Disagree (4), or Strongly Disagree (5). Results from the pre- and post-surveys were analyzed using a paired t-test to determine if there was a change in the level of student confidence following the treatment. The

results were also analyzed to compare the percentage of the distribution of responses between the two surveys.

Ten students from each class were selected to participate in three separate focus group discussions following the survey, observations, and assessments. Participation in the focus groups was voluntary, and the students were carefully selected to ensure that the groups were equitable, diverse, and inclusive in terms of gender, ethnicity, and academic ability. Each group of ten students discussed the same thirteen Student Interview Questions that focused on students' understanding of the concept of CER as a writing framework (Appendix G). An overview of the data collection methods is located in the table below (Table 1).

Table 1. Data Triangulation Matrix

| Research Question | Data Collection Instruments | | | | |
|---|-------------------------------------|---------------------------|---------------------------------------|------------------------------------|--------------------|
| What are the effects of using a Claim, Evidence, and Reasoning framework to apply analytical reasoning to writing in elementary literacy? | Because of Winn Dixie CER Questions | Student Writing Checklist | Pre- and Post-CER Writing Assessments | Written Response Confidence Survey | Student Interviews |

DATA ANALYSIS: CLAIMS AND EVIDENCE

Results

The results of the Claim, Evidence, and Reasoning (CER) Writing Assessment demonstrated that students improved in their ability to apply analytical reasoning to their written answers to reading comprehension questions ($N=65$). The scores from the three, fourth-grade classes that participated in the writing intervention were averaged for both the pre- and post-assessments to determine a mean score for each assessment. Both the pre- and post-assessments consisted of two written responses that were scored on a scale of one to four points, with one representing the lowest, and four representing highest possible score. The pre-assessment average for the three classes was 1.38, or 34.5%, and the post-assessment average was 2.38, or 59.5%. The difference in scores between the assessments represented a 25% increase in the student scores. Student scores on the pre-assessment ranged from a low of one, to a high of three, with a median score of two. On the post-assessment student scores ranged from one to four, with a median score of two. A normalized analysis of the Pre/Post CER Writing Assessment showed a gain of 0.38, which is considered a medium gain. A paired t-test comparing the two assessments resulted in a p-value of 0.002. This value allows for a rejection of the null hypothesis, and an acceptance of the alternative hypothesis that there is a statistical significance in the variation between the pre- and post-assessments (Figure 2).

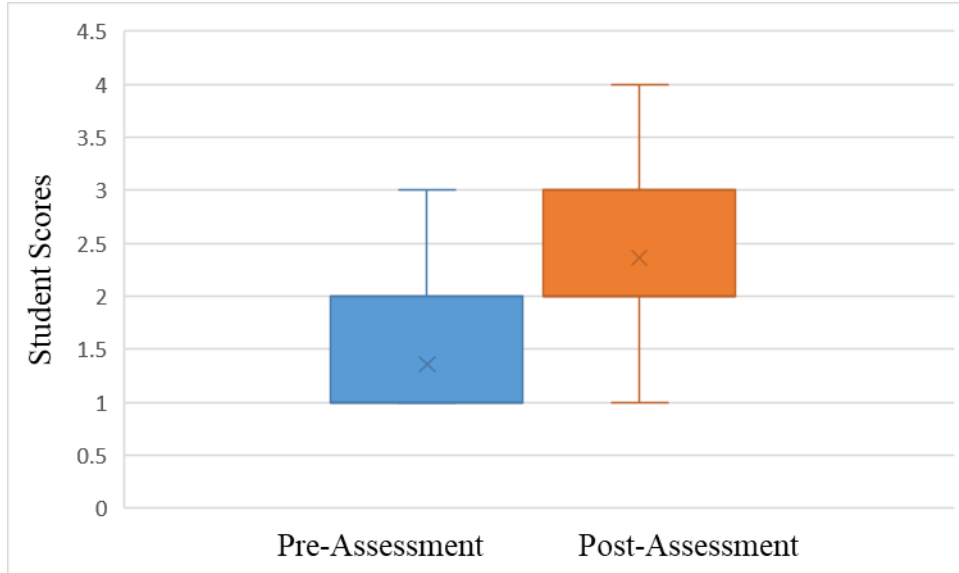


Figure 2. Box and Whisker plot of student results for the CER Writing Assessment, ($N=65$).

The three classes that took part in the writing intervention were a diverse group with over 51% of students in the classes receiving specialized services in the form of either IEPs, 504 plans, or Multilingual Learner services. When the scores for this subgroup ($n=33$) were examined, the results were slightly different. The pre-assessment average for this group was 1.12, or 28%, and the post-assessment average was 1.97, or 49.2%. The difference in these scores represented a 21.2% increase in student scores. Scores for the subgroup on the pre-assessment ranged from a low of one to a high of two, with a median score of one. Scores on the post-assessment ranged for a low of one to a high of four, with a median score of two. A normalized analysis of the Pre/Post CER Writing Assessment for the subgroup showed a gain of 0.13, which is considered a small gain. While the gain was small it was still statistically significant. The results of a paired-test resulted in a p-value of 1.45172E-05. This resulting p-value indicated a probability of less than 0.005%, allowing for a rejection of the null hypothesis,

and an acceptance of the alternative hypothesis, indicating a strong statistical significance between the two assessments (Figure 3).

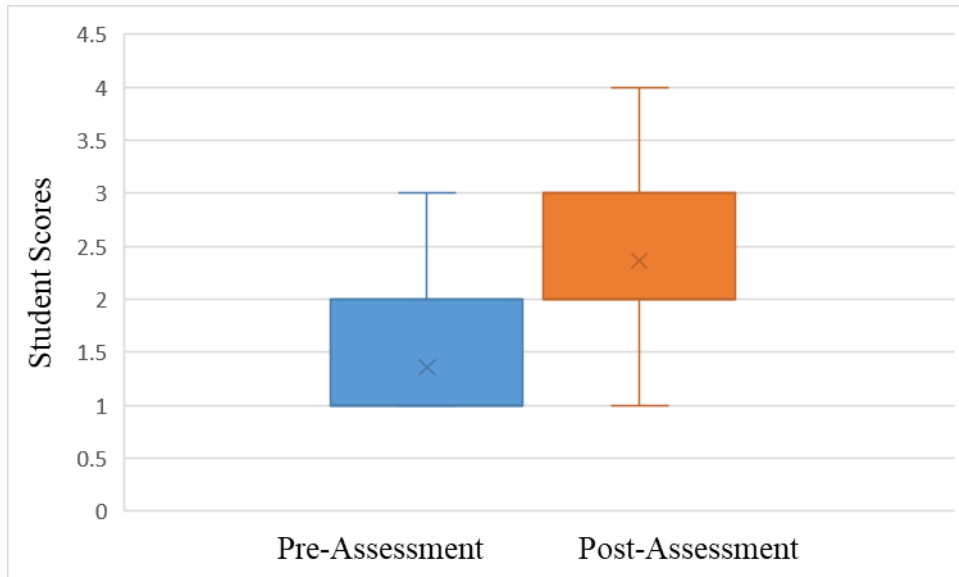


Figure 3. Box and Whisker plot of student subgroup results for the CER Writing Assessment, ($n=33$).

Change in Writing Confidence Survey

Prior to starting the treatment period, students took the Writing Confidence Survey. The purpose of the survey was to determine the level of confidence students had in writing short answers to reading comprehension questions. Additionally, the survey would serve as a means of gauging their level of understanding of the Claim, Evidence, and Reasoning writing framework. Following the treatment period the students retok the survey. The hope was that an examination and comparison of the results of the pre- and post-treatment surveys would provide insight into the student experience, as well as to inform future instruction. The survey consisted of 12 questions and the results of the survey were very positive. Student responses to nine of the twelve questions were indicative of either increased confidence in writing short answer responses

to reading comprehension questions, or a better understanding of the CER writing framework.

Answers were considered positive if students selected either Agree, or Strongly Agree for their response (Figure 4).

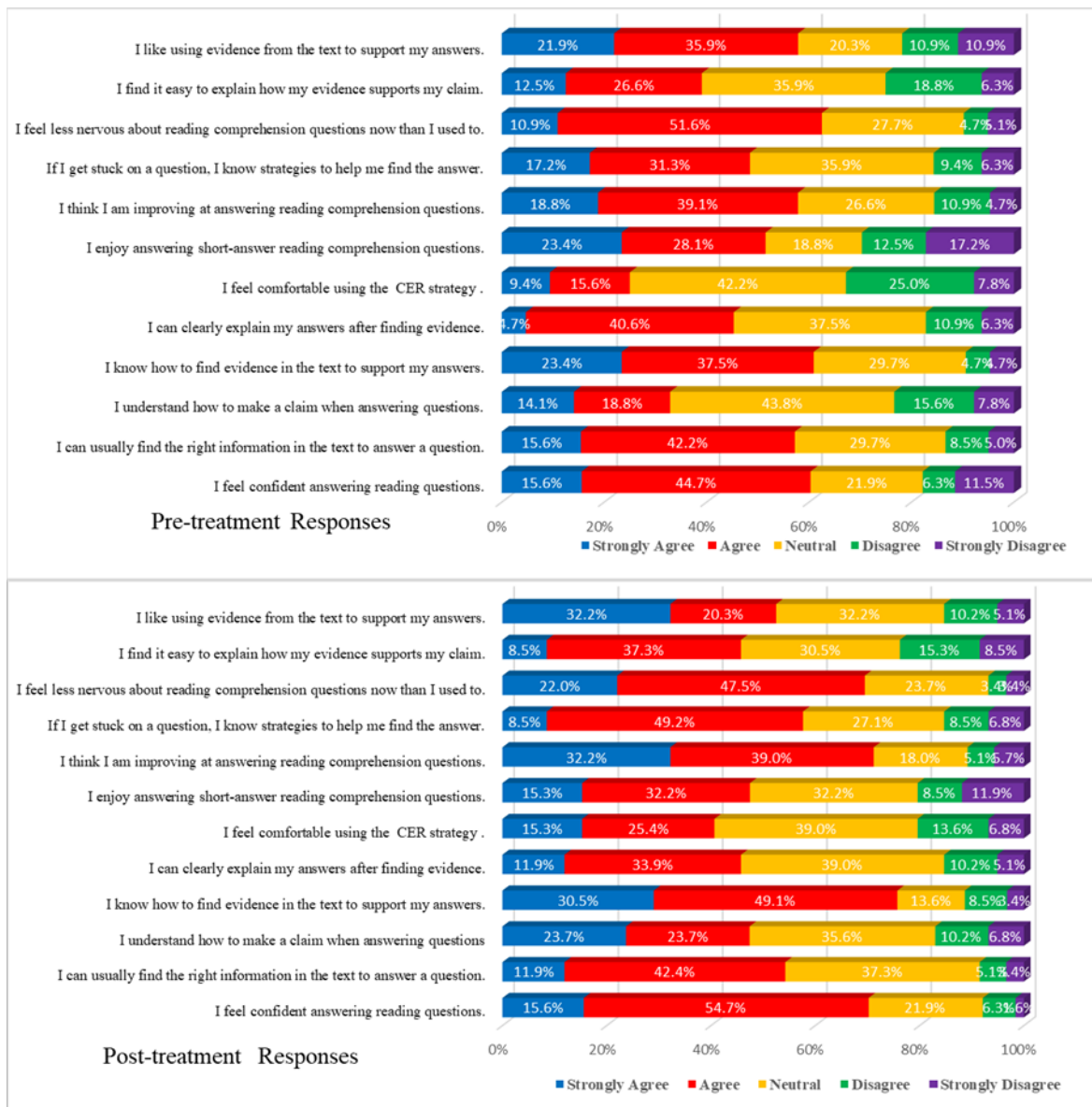


Figure 4. Writing Confidence Survey student responses, (N=65).

When asked whether they felt confident answering reading comprehension questions, 70.3% of respondents responded positively. This was a 10% increase from the first survey.

When asked if they knew strategies to use when stuck on a question, 57.7% of students felt that they had strategies they could utilize, an increase of 27.2% from the first survey. One student stated, “I go back through the passage and look for clue words to help me find evidence.”

Another student said, “I reread the text and look for context clues.” The post-treatment responses also suggested that students felt more comfortable using the CER framework than they did before the treatment, with 40.7% stating that they agreed or strongly agreed with the statement, I feel more comfortable using the CER strategy. This was a 15.7% increase from the 25% of students that responded favorably on the first survey. One student stated that the CER strategy made answering the questions easier because, “It shows you what to do and what you need to include.” In response to the question, how do you know if your reasoning is strong, or if it needs more work, one student responded, “I make sure to read it to make sure it makes sense and see if it supports the evidence.” If it doesn’t explain enough of the evidence, I go back and add more to it.” While most of the responses showed favorable growth, not all of the student responses were positive.

When asked if they liked using evidence from the text to support their answers, 52.5% of the students on the post-treatment survey indicated that they did, marking a 5.3% decrease from the first survey. Students also responded negatively to the statement, I enjoy answering short answer reading comprehension questions, with 4% fewer students responding positively than did on the first survey. The third survey question that showed a decrease in positive responses, asked students if they can usually find the right information in the text to answer a question. While 57.8% of students indicated that they could on the first survey, 3.5% fewer said that they could on the second survey. All combined, the three questions that students answered less

positively towards on the second survey, accounted for a combined 12.8% decrease from the first survey (Figure 5).

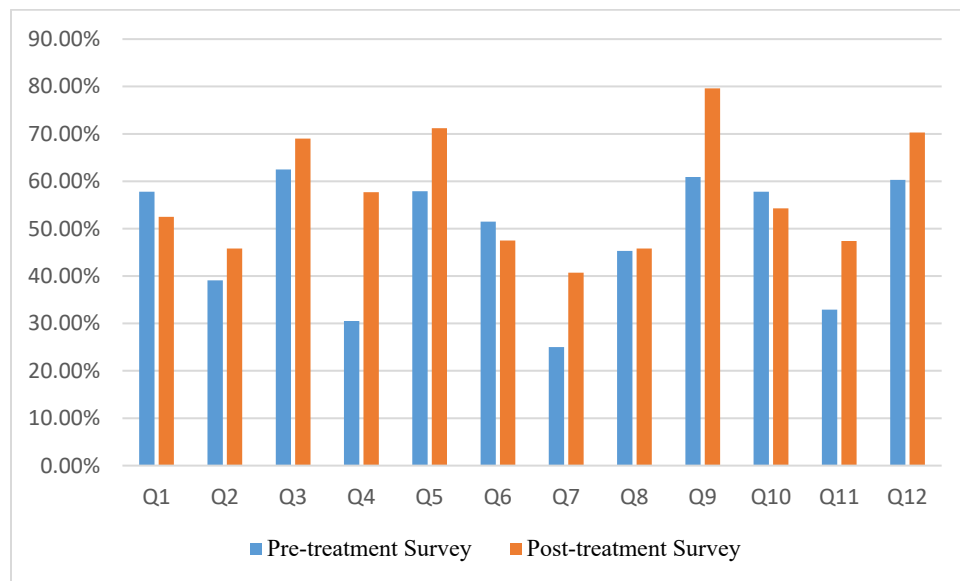


Figure 5. Change in positive student responses from pre- and post-treatment Writing Confidence Survey Questions, ($N=65$).

The Student Writing Checklist that I used to take notes while I observed the students provided little in the way of valuable data, save for one notable observation. Prior to the writing intervention many of the students struggled to get started on their writing. They would spend considerable time looking at the questions and rereading the text, but would be hesitant to begin writing, even to the extent that they would run out of class time before they were able to formulate a response. Following the intervention students began writing their responses noticeably quicker, and did not exhibit the same hesitation that was observed prior to the writing intervention.

VALUE: REASONING AND REFLECTION

Claims From the Study

The goal of this research was to determine if my fourth-grade ELA students could use a Claim, Evidence, and Reasoning framework to improve their ability to apply analytical reasoning to their writing. After a nine week study period the results suggest that CER can be utilized as an effective tool in my classroom to accomplish that end. The data from both the writing assessments and the pre- and post-treatment surveys support this claim. The assessment data provides clear, quantitative evidence that links the use of the writing framework to improved student writing scores. On the whole, student writing improved between the pre- and post-treatment writing assessments. While many of the student writing scores still fell short of meeting a passing writing score of three or higher using the CER rubric, the goal of the research was to demonstrate growth, not proficiency, and that was achieved.

The data from the survey further supports the claim by showing the increase in positive responses from the pre-treatment to the post-treatment survey. The survey responses showed a trend of positive change in both confidence in writing their short answer responses, and a deeper understanding of the CER framework.

In addition to the quantitative data, the student interview responses provided the necessary qualitative lens through which to examine the students' point of view and gain insight into their experience. Hearing what they thought about the treatment process and their assessment of their own learning, filled in the gaps and provided a holistic understanding of the positive changes that took place.

The observations that I noted on the Student Writing Checklist while limited, did provide some insight into the students' level of confidence in engaging with the work. The fact that they were observed spending less time trying to formulate their written responses suggest that they had gained a greater degree of confidence in their writing ability as a result of the intervention.

Value of the Study and Consideration for Further Research

Teaching fourth-grade for fourteen years at the same school and in the same classroom has provided me with a unique perspective into how my students approach their writing. Fourth-graders arrive to my classroom having spent the previous four years building their writing toolboxes, and while I invariably will have students that will arrive to my classroom as strong writers, for many of my students writing is a real struggle, and one that only gets harder as the school year goes by, and expectations increase. In fourteen years that problem has not gotten measurably better, nor has it gone away. I have tried many approaches to help my struggling writers, but as of yet no single approach has yielded consistently better results than any other method or approach. Following in the footsteps of previous researchers, I had come to the undeniable conclusion that more research into argumentative writing interventions was a critical necessity (Ferretti & Graham, 2019).

My students often tell me that they know what they want to say, they just don't know how to say it. They are willing writers, but they lack the tools to articulate their ideas. Providing my students with a structured framework that allows them to show what they know, not only has real value in my classroom, but also aligns with best practices in writing, and in particular, argumentative writing (Graham et al., 2019). I believe that the action research I have undertaken over the last month and a half has shown me that utilizing a CER writing framework can provide

that necessary structure for students, and ultimately result in higher quality writing as evidenced by the increased writing scores over the course of the research period. These improved scores echo the conclusions of other researchers who have found that CER can be an effective teaching framework for argumentative writing in a variety of classroom environments (Fleming et al., 2022). While the high scores tell part of the story and reassure me that I am on the right track, the feedback I received from the students through their surveys and interviews is even more valuable. When asked during the interviews to explain what a claim was, one student responded, “It’s what you believe or think based on the evidence in the text. You’re saying what you think is correct.” When asked why it’s important to include evidence from the text in your answer, another student stated, “You really don’t have evidence if it’s not from the book, and it’s basically your opinion, and reader might not believe you. It makes your answer stronger.” The increase in confidence and understanding is clear, and these student responses show real growth by demonstrating an understanding of the framework by using more domain-specific academic language, and articulating their ideas more clearly. The increase in confidence aligns well with the increase in confidence noted by other researchers that found that using CER in the ELA classroom not only increased student confidence, but also increased the frequency of well-reasoned arguments in student writing samples (Platt, 2020).

Impact of Action Research on the Author

Undertaking this action research study has been incredibly impactful for me. The overwhelming nature and scope of the research frankly terrified me at the onset. I could not imagine how all of the various parts and pieces would coalesce into a research paper that was not only clear in its focus, but one that would provide tangible value for not only myself, but

ultimately for my present and future students. Somewhere along the way I discovered that the action research process was providing me with the very same structure that I was attempting to provide for my students in their writing.

Structure is a word that that can bring to mind rigidity, but I have found through this process that it can be quite the opposite. With a solid structure in place for the this research I was able to focus on creativity, take new approaches to my teaching, and break free from the safety net of continuing to do what I have always done as a teacher. Complacency is an easy trap to fall into as a teacher, especially if you have stayed in the same grade, teaching the same subjects, year after year after year. The action research process really helped me to readjust my focus, open myself to new ideas, and most importantly, reaffirm my commitment to being a reflective practitioner.

Part of being a reflective practitioner is admitting when things don't go as well as you had planned, and while I feel that my research did provide valuable insight into what was working with my students, it also illuminated some things that fell short. One area that jumps out at me is the lack of growth among my students receiving Multilingual Learner Services. These students were underserved by my approach and I need to do more to ensure that they are making growth with the rest of my students. These students will need an even higher degree of structure and I will need to make changes in how I teach writing to help accomplish that. In the future that might include providing more structured sentence starters, incorporating more visuals to help students make stronger connections, and increasing the time dedicated to teaching the CER framework in order to provide these students with the greatest opportunity for success. The number of students at my school that speak English as a second language is increasing every

year, and any instructional approach that doesn't take that into consideration is at best shortsighted, and at worse, inequitable. The rising tide needs to lift all of the boats, and I need to make sure that all of my students feel empowered, and have the necessary tools and support to continue their journey as lifelong learners. I must also remember that they are not the only ones taking the journey.

My own academic journey over the last two and a half years has been an enlightening one. The MSSE program at Montana State University has allowed me to rediscover the confidence that comes from embracing new challenges, the shift in mindset that happens when gaining new understandings, and the sense of community that develops from working with a collaborative cohort of like-minded educators. With the rapid approach of the coming school year, I am looking forward to building upon the success I experienced using CER in my classroom last year. Having had some time to reflect on my action research experience, I am excited to continue the action research cycle. I will work to expand the application of CER in my classroom across different content areas, in different contexts, and ultimately to utilize CER to help my students continue to build robust, evidence-based, well-reasoned written arguments.

As I take a final look back at all that I have accomplished in the action research process, I am reminded of a journal entry that I made as part of weekly discussion rubric for one of the courses I took early in the MSSE program. At the bottom of the entry I sketched a stick figure man jumping over what I called the Pit of low self-esteem and negative thinking, along with a note that said that taking academic risks leads to growth (Figure 6).

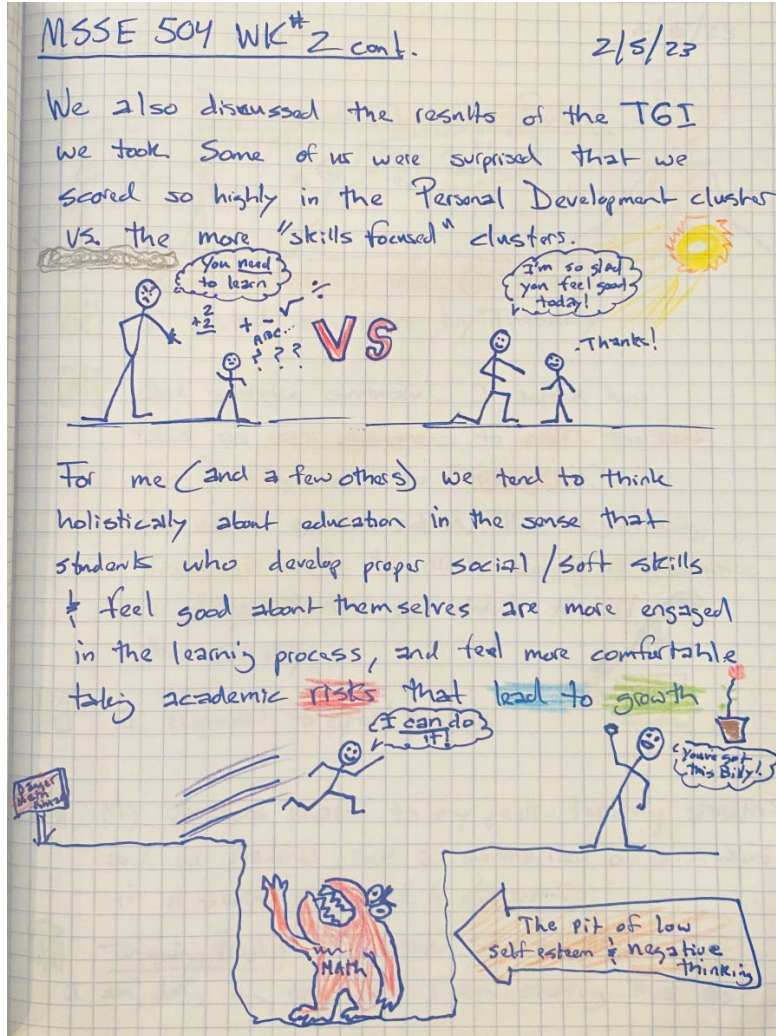


Figure 6. Discussion rubric journal

I think this journal entry serves as an excellent metaphor for my action research journey. By overcoming the fear of trying something new, venturing into the uncomfortable and the unknown, has allowed me to grow as an educator. While I originally intended the drawing to represent the risks that I want my students to take in their academic journey, with hindsight I can see now that it applies equally to me.

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APPENDICES

APPENDIX A

MONTANA STATE UNIVERSITY IRB EXEMPTION

Hello Martin, Chad,

Your protocol was reviewed by the IRB and has been approved.

PI: Martin, Chad

Approval Date: 12/4/2024

Title: CLAIM, EVIDENCE, AND REASONING AS A WRITING FRAMEWORK IN
ELEMENTARY LITERACY

Protocol #: 2024-1881-EXEMPT

Review Type: Exemption

Expiration Date: 12/4/2029

APPENDIX B

BECAUSE OF WINN DIXIE CER QUESTIONS

Pre-Assessment Questions

1. Why does Opal say that she and Winn-Dixie were “almost like orphans”?

Claim: Opal says she and Winn-Dixie were almost like orphans because they both didn’t have anyone to take care of them.

Evidence: In the text, Opal explains how she doesn’t have a mother and how Winn-Dixie didn’t have a family to look after him.

Reasoning: This shows that Opal feels connected to Winn-Dixie because they are both lonely and looking for love and care.

2. What makes Opal decide to keep Winn-Dixie?

Claim: Opal decides to keep Winn-Dixie because she feels sorry for him and wants to help him.

Evidence: In the story, when Winn-Dixie smiles at her, she feels like he needs her, and she decides to ask her father if they can keep him.

Reasoning: Opal’s decision shows that she is caring and doesn’t want to leave the dog alone because she understands what it feels like to be lonely.

1. Why does Opal’s father agree to let her keep Winn-Dixie?

Claim: Opal’s father agrees to let her keep Winn-Dixie because he can see that she really cares about the dog.

Evidence: The text says that her father looked at Winn-Dixie for a long time and saw how happy Opal was with him.

Reasoning: This shows that Opal’s father wants to make her happy, and he realizes that Winn-Dixie could be good for her.

2. How does Opal describe her father?

Claim: Opal describes her father as a preacher who is quiet and serious.

Evidence: She says in the text that he is "like a turtle hiding inside its shell" because he doesn’t talk much or show his feelings.

Reasoning: This description shows that Opal’s father is emotionally distant, which makes it hard for Opal to connect with him.

1. Why does Opal feel sad when she talks about her mother?

Claim: Opal feels sad when she talks about her mother because she misses her and doesn’t know why her mother left.

Evidence: The text mentions that Opal’s mother left when she was very young, and she often wonders about her.

Reasoning: This shows that Opal feels abandoned and wishes she knew more about her mother, which makes her feel sad and curious.

2. How does Winn-Dixie help Opal feel less lonely?

Claim: Winn-Dixie helps Opal feel less lonely because he is always with her and makes her happy.

Evidence: In the story, Opal says that Winn-Dixie smiles at her and follows her everywhere, which makes her laugh and feel good.

Reasoning: This shows that Winn-Dixie provides comfort and companionship, helping Opal not feel so alone.

1. What does Opal learn about her mother from her father?

Claim: Opal learns that her mother liked to laugh and have fun, but she also had problems.

Evidence: In the text, Opal’s father tells her that her mother couldn’t stop drinking and that was one of the reasons she left.

Reasoning: This helps Opal understand that her mother had struggles, which might explain why she isn’t part of her life anymore.

2. Why does Opal want to know ten things about her mother?

Claim: Opal wants to know ten things about her mother because she hopes it will help her feel closer to her.

Evidence: The text says that Opal asks her father to tell her ten things because she knows so little about her mother.

Reasoning: Opal believes that learning more about her mother will help her understand her better and feel less disconnected.

Post-Assessment Questions

1. Why does Opal take Winn-Dixie to church?

Claim: Opal takes Winn-Dixie to church because she doesn't want to leave him alone and believes he will behave.

Evidence: In the story, Opal explains that she couldn't stand the thought of Winn-Dixie being sad while she was away, so she brought him with her.

Reasoning: This shows that Opal feels responsible for Winn-Dixie and wants to keep him close because he is her new friend.

1. How does the preacher react when Winn-Dixie comes into the church?

Claim: The preacher is surprised but tries to stay calm when Winn-Dixie enters the church.

Evidence: The text says that the preacher was "just about to start preaching" when he saw Winn-Dixie and froze, but then he let the dog stay.

Reasoning: This shows that even though the preacher was shocked, he accepted Winn-Dixie because he knew how much Opal cared about him.

1. Why do you think the preacher allowed Winn-Dixie to stay in the church?

Claim: The preacher allowed Winn-Dixie to stay in the church because he wanted to make Opal happy.

Evidence: In the text, the preacher allows the dog to sit quietly in the pew after he sees how much Opal wants him there.

Reasoning: This shows that the preacher is willing to bend the rules for Opal, showing that he cares about her feelings.

2. What is Opal's attitude toward church and how does it change with Winn-Dixie there?

Claim: At first, Opal doesn't seem too interested in church, but with Winn-Dixie, she becomes more engaged.

Evidence: Opal says that usually she would feel bored, but having Winn-Dixie made her feel happy and excited.

Reasoning: This shows that Winn-Dixie makes Opal more comfortable and interested, even in situations she didn't care about before.

1. How does Winn-Dixie behave when Opal takes him to the library?

Claim: Winn-Dixie behaves curiously in the library but causes trouble by scaring the librarian.

Evidence: The text says that when Winn-Dixie entered the library, Miss Franny thought he was a bear and screamed.

Reasoning: This shows that Winn-Dixie is still a bit wild and unpredictable, even though Opal tries to control him.

2. What does Miss Franny tell Opal about the time she saw a bear in the library?

Claim: Miss Franny tells Opal that she once saw a bear in the library when she was young.

Evidence: In the story, Miss Franny says a big bear came into the library and took a book right off the shelf.

Reasoning: This story shows that Miss Franny has had exciting experiences and makes the connection between Winn-Dixie and her memory of the bear.

1. Why does Opal want to be friends with Miss Franny?

Claim: Opal wants to be friends with Miss Franny because she feels lonely and thinks Miss Franny could be a good friend.

Evidence: In the text, Opal says that she doesn't have many friends, and she likes Miss Franny's stories.

Reasoning: This shows that Opal is looking for connections and believes Miss Franny can provide her with friendship and interesting stories.

2. What does Miss Franny's story about the bear tell us about her personality?

Claim: Miss Franny's story about the bear shows that she is brave and has a good sense of humor.

Evidence: The text says that she stayed calm when the bear came into the library, and now she can laugh about it.

Reasoning: This shows that Miss Franny has faced scary situations but can look back on them with courage and humor.

APPENDIX C

CLAIM, EVIDENCE, AND REASONING RUBRIC

| Claim, Evidence, and Reasoning Rubric | | |
|---------------------------------------|--------------------------|---|
| Score | Criteria | Description |
| 4 | Exemplary | <p>Claim: Clearly stated and insightful, directly addressing the question.</p> <p>Evidence: Strong textual support, accurately quoted or paraphrased, and directly linked to the claim.</p> <p>Reasoning: Well-developed explanation connecting the claim and evidence, demonstrating deep understanding of the text and its implications.</p> |
| 3 | Proficient | <p>Claim: Clearly stated and relevant, addressing the question effectively.</p> <p>Evidence: Sufficient textual support that is mostly accurate and relevant to the claim.</p> <p>Reasoning: Clear explanation connecting the claim and evidence, showing a good understanding of the text.</p> |
| 2 | Basic | <p>Claim: Vaguely stated or somewhat unclear, partially addressing the question.</p> <p>Evidence: Limited textual support, may lack accuracy or relevance to the claim.</p> <p>Reasoning: Weak connection between claim and evidence, showing minimal understanding of the text.</p> |
| 1 | Needs Improvement | <p>Claim: Unclear or missing, does not address the question.</p> <p>Evidence: No textual support or irrelevant evidence provided.</p> <p>Reasoning: Lacks connection between claim and evidence, demonstrating little to no understanding of the text.</p> |

APPENDIX D

STUDENT WRITING CHECKLIST

Student Writing Checklist

Date: _____

Teacher: _____

Class/Period: _____

Book Chapter: _____

| Observed Behavior | Observed | Not Observed | Notes |
|---|----------|--------------|-------|
| Student Behavior | | | |
| Actively engaged in activity | | | |
| Shows off-task behavior | | | |
| Working with other students | | | |
| Working Independently | | | |
| Requests/requires teacher assistance | | | |
| Works without teacher assistance | | | |
| Claim Evidence Reasoning | | | |
| Makes a claim in writing | | | |
| Supports answer with textual evidence from book | | | |
| Provides reasons to support evidence | | | |
| Writing Conventions | | | |
| Writes in complete sentences | | | |
| Restates question in answer | | | |
| Use grade-level writing conventions | | | |
| Task Completion | | | |
| Completes assigned task | | | |
| Does not complete Task | | | |

APPENDIX E

CER WRITING ASSESSMENT

Writing Assessment

Name _____

Date _____

Directions: Read the passage below and then respond to the questions.

Liam ran into his house, slamming the door behind him. He threw his book bag on the floor and plopped onto the couch. After six hours of playing *Fortnite*, he ate some pizza and fell asleep with a slice on his stomach and his feet on his book bag. When Liam came home from school the next day, he was noticeably upset. He balled up his report card and placed it inside a soup can in the garbage. He then flipped the soup can upside down in the garbage can and arranged loose pieces of trash over it. As he plopped down on the couch, he let out a sigh and picked up his controller.

1. Why is Liam distraught (worried)?

Answer: _____

2. Why does Liam put the report card in a soup can?

Answer: _____

APPENDIX F

WRITTEN RESPONSE CONFIDENCE SURVEY

Written Response Confidence Survey

The purpose of this survey is to help me understand how you are feeling about writing short answer responses. This is an anonymous survey. Your name won't be on your survey.

Instructions: Read each statement carefully. Choose how much you agree or disagree with the statement by checking the box for the choice that best describes how you feel.

| | |
|---|---|
| I feel confident when answering short-answer reading comprehension questions. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | I enjoy answering short-answer reading comprehension questions. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |
| I can usually find the right information in the text to answer a question. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | I think I am improving at answering reading comprehension questions. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |
| I understand how to make a claim when answering reading comprehension questions. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | If I get stuck on a question, I know strategies to help me find the answer. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |
| I know how to find evidence in the text to support my answers. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | I feel less nervous about reading comprehension questions now than I used to. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |
| I can clearly explain my answers after finding evidence. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | I find it easy to explain how my evidence supports my claim. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |
| I feel comfortable using the Claim-Evidence-Reasoning (CER) strategy in my answers. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree | I like using evidence from the text to support my answers. <ul style="list-style-type: none"> <input type="radio"/> Strongly Agree <input type="radio"/> Agree <input type="radio"/> Neutral <input type="radio"/> Disagree <input type="radio"/> Strongly Disagree |

APPENDIX G

STUDENT INTERVIEW QUESTIONS

Student interview questions

1. Can you explain what a "claim" is when you're answering a reading question?
2. Why do you think it's important to make a claim?
3. What does "evidence" mean when you're answering reading questions?
4. How do you find evidence in the text to support your claim?
5. Why is it important to use evidence from the text instead of just your own ideas?
6. What does "reasoning" mean in the CER framework?
7. Why do you think it's important to connect your evidence and claim with reasoning?
8. How does using the CER framework help you when you're answering reading questions?
9. Do you find any part of the CER framework easier or harder to use? Why?
10. What strategies do you use when you can't find evidence for your claim?
11. How do you know if your reasoning is strong or needs more work?
12. Do you think the CER framework has changed how you understand the stories or passages you read? How?
13. Is there anything else you'd like me to know?