

INCREASING STUDENT ACHEIVEMENT
THROUGH MODIFICATION OF COGNITIVE RUBRICS
IN THE SUMMIT LEARNING PLATFORM.

by

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of

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In

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DEDICATION

I dedicate this to all the amazing hardworking teachers and medical professionals who worked during the COVID 19 pandemic, it's these individuals that have inspired and motivated me to finish this project. Most importantly, I dedicate this to any friends and family who lost their lives during the pandemic including my grandmother, Janet Haren. We appreciate your love and contributions you made to our community.

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I would like to acknowledge all of the individuals who helped me with the research and the institutions who made it possible. I would like to acknowledge Three Springs High School in the Cheney Public School District for offering students an alternative option to their learning. It's this institution and its leaders who made my success possible. Cathleen Scott, our principal, has made an incredible impact on my accomplishment and the triumph of our student.

I would like to acknowledge the Summit Learning Platform for creating this great curriculum that is free for institutions to use. They provided me with a truly amazing tool on which to build my knowledge and allow me the freedom to do so.

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ABSTRACT

Summit Learning Platform is a project-based curriculum offered to 4th -12th grade students nationwide. The projects are assessed using Summit Learning Cognitive Skills Rubrics. The Cognitive Skills Rubrics are an assessment and instructional tool that outlines 36 interdisciplinary, higher-order thinking skills that students will need for life beyond high school. In this investigation, modifications were made to the cognitive rubrics by making Lexile appropriate changes in order to meet grade appropriate levels. The students conducted a project using these modified rubrics in order to measure their achievement and perception of the platform. The data suggests that by modifying the rubrics, we can improve student achievement and increase their perception of the platform. Additionally, the changes also improved their perception of science as a subject while also increasing teacher self-confidence and motivation

INTRODUCTION

Introduction & Background

My Action Research topic examined high school student awareness of the online platform they use for their curriculum: How is Summit Learning Platform an effective teaching curriculum for science education? Summit Learning Platform's curriculum centers around projects relating to the real world. The projects are directed by students, while teachers continually give feedback along the way using cognitive rubrics (Tavener, 2018). Since Summit Learning Platform is a relatively new addition to our school, I've decided to center my Action Research topic around it.

Summit Learning Platform was founded in the 2015-2016 school year. "Summit Learning is a research-based approach to education designed to drive student engagement, meaningful learning, and strong student-teacher relationships that prepare students for life after graduation" (Tavener, 2018, p. 3). Summit is a free education platform designed by teachers for teachers. Many schools in Washington and California have introduced this curriculum as a means to improve student growth and achievement; my school was no different.

The platform is very customizable and has the ability for educators to make modifications where they deem fit. In the case of my project, I looked at customizing the cognitive rubrics (provided by Summit) to make the language student friendly as it relates to my students' final projects. The Summit-provided cognitive rubrics can be full of educational jargon not suitable for all learning levels, and in my experience these often get overlooked by students, adding to the confusion of how Summit projects get graded. My goal was to clear up this confusion in order to maximize student achievement through the platform.

Summit Learning Platform is a curriculum that centers around a hybridized project-based learning. For example, students spend part of the learning day online, while also attending a regular school day. Students receive support online through the platform and face-to-face instruction from their teacher. This was the appealing nature of the platform and one of the reasons why my school implemented it in Fall 2019. Since implementation, there has been mixed reviews from students. The perception of the platform has been mostly negative, particularly to the students who have been at our school the longest. They are having a hard time transitioning from the previous curriculum. This is the reason one of my sub questions relates to adjusting students' perceptions toward the platform.

My classes are mostly comprised of students who choose to come to an alternative school (ALE) and are in grades 9 through 12. Most of my students are Caucasian, there is very little diversity, and about 33% of our student population have Individual Education Plans (IEP's). This number seems very high, but our total population at our school is only 61. We are small, but also, we cater to the needs of ALL our students. Most students chose the alternative school because of social emotional needs. The curriculum change was in response to how much my school was growing. In fall of 2018 we only had 34 students. With this positive growth, we needed a more efficient way of instructing our students.

This past fall I was teaching two sections of biology. This is perfect because it allowed me to have one class devoted to my experimental group and the other as my comparison group. Once conducted it allowed me then to compare/contrast the two group for the analysis of my data. My research began on Oct 5 and was completed by November 6th. I spent the first lessons taking pre assessments and preparing to gather enough initial data.

The students used Summit Learning Platform as their curriculum. Summit is a school wide adopted curriculum and is used in all of our core classes at our school. The curriculum I have selected includes two projects that will be conducted throughout the 8 weeks. Although, the first project assesses a minimal amount of material, I gathered data on the second project titled Bioremediation. That will begin on October 5th and gave students enough time to practice with the platform before starting the treatments. The projects are graded using platform specific cognitive rubrics. These are what I used and modified for my treatment.

Additionally, there are two power focus areas which are done simultaneously with the projects. The power focus areas are independent work, that students do, to better learn the material to conduct the project. They are typically worth 20% of the students final grade These consist of resources and documents the students can access in order to learn the material. It's important that the students completed these, to gain enough knowledge on the project.

Support Team

My Support team consists of four colleagues. Two are from my school, one is a professor from Eastern Washington University, and the last is a former mentor from the Murdock Grant. Each of these people offers a unique perspective and brings a balance to my work, and they were all willing to challenge me and my work in different ways. My support team was:

Lindsey Villeneuve – ELA teacher at Three Springs High School

Catheleen Scott – School Administrator at Three Springs High School

Kristian Magori – Associate Professor at Eastern Washington University

Kim Popham – Science teacher and mentor for MJ Murdock Partners in Science

Lindsey Villeneuve served to support my work by focusing on my clarity in content, organization of ideas, and editing my work as I go. Due to the small size of our school, I have

close and regular contact with Lindsey, so she is a reliable team member for me and is available to read/edit my work as I go. She has experience editing and reading graduate level papers and because this is outside of her content area, can offer a unique perspective and see where my writing needs more for the general audience. Additionally, she is part of my team and has knowledge of the Summit Learning Platform which is valuable by itself.

Catheleen Scott is the principal at Three Springs High School. She has been instrumental in implementing the Summit Learning Platform at our school and has been a valuable voice in planning my action research. She was the one to suggest two sections of biology as well as suggesting to use IBA's (Interim Based Assessments) as one of my instruments. She has strong planning skills because she is experienced in working with graduate students in her field of social work. She was the first person I called in the event of an emergency related to my research. I also had regular contact with her as I see her on a daily basis.

Kristian Magori is the associate professor at Eastern Washington University. He teaches biological statistics and provided wonderful insight on the treatments that I introduce on my action research. Kristian had been and will continue to be my partner in "The Partners of Science" grant through MJ Murdock. As such, he has been a long-term mentor to me and has agreed to read my work and sit on my graduate committee. Because of his background in biological statistics, he brought valuable insight to the treatments I introduce in my research. He is an expert in his field and a trusted colleague.

Kim Popham is a valuable member of my team, and I am thankful for her contribution. I know Kim as my mentor through "The Partners in Science" grant and she was the one who encouraged me to get my degree through MSU. She has been an asset to my team as she is

deeply invested in science and is a huge support to me. She offers regular monthly communications with me offering science-based lesson plans and ideas.

Overall, the team was rounded, has knowledge of Summit or biology, and is available to give regular feedback and support when necessary. I am comfortable discussing my action research with each of these individuals and feel they are a perfect combination for me.

Action Research Question

What are the results of modifying the cognitive rubrics to be student-friendly in the Summit Learning Platform and how will they lead to an increase in student achievement?

1. What correlation exists between student achievement and cognitive rubrics used to score the projects?
2. How will using student-friendly language improve student perception of the platform?
3. How might the changes to the platform inform and affect my practice?

CONCEPTUAL FRAMEWORK

Project Literature

Mills' research outlines how online learning at school can provide an alternative option for students in need of a nontraditional setting (Mills, 2011). This closely reflects my work because I am modeling my projects after the same ideas. However, I used a different online platform, whereas Mills used APEX Virtual Learning, a different online curriculum, I used the Summit Learning Platform. Mills' work investigates the idea that virtual learning is beneficial to his population of students and that it is comparable to traditional learning. Similarly, he gathered data that analyzed how students perceived their learning while using the platform. My research followed a similar method, because I am interested in how student perception of the platform changes over time. To do this, I followed similar methods of collecting student surveys as pre and post data. Additionally, Mills used the Measure of Academic Progress (MAP) score data to analyze the effectiveness of student learning on the platform. I used a similar method, but instead of MAP I used Smarter Balanced Assessment Consortium (SBAC) data, which is more aligned with our state assessment.

Another article that closely relates to my project is: Measuring the Effectiveness of Projects and Student Learning Ownership Through Differentiated Assessments in Science (Lilley, 2014). Upon reading through this literature, Lilley uses a concise way to set up their experimental design. Not only were student surveys gathered before and after the design, Lilley also takes student interviews. They justify this by explaining that the students were more willing to share information about the changes made in the interview format. Lilley's research guides my own because they were interested in how attitudes changed towards assessments when they were

modified. That reflects my research because I looked to make modifications toward my learning platform (cognitive rubrics).

Theoretical Underpinning

An article written by Jered Keengwe & Terry Kidd (2010) reveals a theoretical framework for my research that provides evidence of the benefits and challenges of online learning. More and more universities and public schools are integrating technology into their learning. Some offer a complete online experience, while others tend to offer a blended model, much like my school. Students experience mobile learning and social networking primarily defined as integrative distance coursework distributed online through online learning platforms. Summit Learning Platform is an example of this. Blended course work offers a unique way of teaching. Keengwe & Kidd suggest that learning platforms don't take the place of grading, instructional design, or one on one help for students (Keengwe, 2010). In fact, that is how the blending model of teaching has become popular. There is a tremendous amount of work surrounding the modification and facilitation of online learners. Pedagogical practices still apply and require educators to review and modify content. In relation to my projects, I modified the curriculum (cognitive rubrics) in order to observe student achievement. Changes to online curriculum add to the continual work an educator might be responsible for when embarking in online instruction.

Methodology Literature

Kathryn Maddens article "The Use of Inquiry-Based Instruction to Increase motivation..." describes how student interviews were designed to illicit student responses (Madden, 2011). This methodology is particularly useful to my research because I needed to

understand student reasoning regarding the Summit learning platform and how that has been affecting their learning. Madden used a ranking method to gather a range of responses from the students. It takes qualitative data and helps quantifies it. Additionally, Madden uses MAP data to assess student achievement. Similarly, to Mills, 2011 Madden has yet another source of data in her methods section that appeals to me. During the data collection, Madden gathered a Teacher Observation Log. This was an important tool to incorporate into my study.

Another article titled “Using Interactive Science Notebooks to Enhance Science” shows a similar method of developing a student survey. It had less than 10 questions for students to complete (Lieberg, 2013). This is a technique I applied to my own research. My student surveys were simple to complete so student responses were meaningful.

Future Project Literature

Another related article suggests that online material can overwhelm students due to the language and tremendous number of links (Franklin, 2002). The desire for more student driven language is needed in online curriculum. For my class, Summit provides cognitive rubrics students use on every project they submit. These rubrics are common across all subjects. However, students don’t seem to use them to justify their work. By modifying the language in these cognitive rubrics, my goal was to increase their achievement in any project on summit. The idea being that student friendly language might reduce the overwhelming feelings of confusion related to interpreting and applying the rubrics. In the future, I hope to continue this research across content areas. If my research has positive results, this could affect the way other classes using summit apply the cognitive rubrics to students. The initial step in developing a scoring rubric is to clearly identify the qualities that need to be displayed in the student’s work to demonstrate proficient performance (Moskal, 2000). Summit supplies each project with these

rubrics. However, they are written in a way that often confuses the students from understanding the differences between a high, medium, and low proficiency. Understanding this contrast is clear to most of the instructors but remains cloudy to the students. For example, understanding the difference between a score of 4 to a score of 5. If students are expected to develop projects with known expectations, then they should be following a rubric that is written in student friendly language. This is defined as writing rubrics at grade appropriate levels with language that the students can understand. Additionally, Moskal (2000) suggests that applying a checklist to individual parts of the rubric can greatly enhance student work, so I did this as well.

The results and information that I gathered from my research was shared with the other educators at my school first. There are a total of five teachers at my school. We are all in our first year implementing Summit Learning, so any tips in student success was helpful to the other educators.

On a broader scale, my data could be shared with other schools implementing Summit. Summit has a network of interconnected schools always looking to improve the program, so their schools could use my research to support learning in their classrooms. Summit suggested the idea of writing student-friendly rubrics, however there was no data to support that idea. This makes my research potentially influential.

METHODOLOGY

Class Demographic

The two classes had equal numbers of students. Both groups had 10 students (Table 1). The changes to the cognitive rubric happened in my first period class. The data gathered was collected via the Summit Learning Platform, and then it was organized by grade level and class in an Excel spreadsheet. The data organized by Summit told me what scores were reached for each of the cognitive rubrics. Both classes did have on average different grade levels. However, in terms of ability and skill these classes remain similar because the students who are taking this class in their 10th grade year are deficient in credits.

Table 1. Class Demographic.

Class Period	Total Students	Boys	Girls	Free & Reduced Lunch	Special Education	Average Grade Level
1 st (Experimental Group)	10	8	2	6	2	9th
2 nd (Comparison Group)	10	5	5	5	1	10th

Treatment

The treatment that was introduced to the students included five checkpoints which lead up to the final project. Each checkpoint acted as intermediate steps leading up to the final project. For example, check point one centers around constructing an introduction and prediction that the students will use later in their final product. Students built pieces of the lab report

gradually as they complete each checkpoint and then write their work directly into the appropriate sections as it corresponds to their checkpoint completion.

The final project had two components:

- 1) They students designed and conducted a multi-week bioremediation experiment using radish plants and different chemicals found in cell phones and other electronics.

Bioremediation is the practice of using biological life to remedy ecosystems.

- 2) They would analyze and communicate the results in the form of a scientific Lab Report.

The report consisted of the following sections: Introduction, Materials and Procedures, Results, and Conclusion. Lastly, the students would use the results they gathered to communicate any recommendations to Apple and Google about what they should do about their E-Waste problem.

Research Method

I took the first week to establish an on boarding process for any new students. This is typical at the start of the year. Afterwards, I introduced the projects to both classes and introduced all the cognitive rubrics included in them. Those are titled identifying patterns, interpreting data, making connections and inferences, explaining evidence, introductions and conclusions, asking questions, planning and carrying out investigations, and prediction/hypothesizing.

Essential Question

- How can living things be used to clean the environment of the toxins produced by e-waste?
- How can humans reverse the damage they do to the environment?

Enduring Understanding

- Your electronics like cell phones, computers, and TVs contain chemicals such as zinc, copper, lead, and mercury which are toxic to humans and damage our environment.
- The usage and disposal of electronics with toxins like these impact our environment.
- This human activity and use of resources impacts natural systems and human health.
- Fast plants can be used to remove these toxins from our environment. This is an example of bioremediation.

Description

Excited for the newest iPhone? What about the Apple iWatch? Don't you wish you had that new gaming system? Already tired of your Galaxy phone? Before you run off to the store to buy the latest and greatest smart phone, you should pause and take a moment to think about where your electronic is coming from and what you are going to do with your old stuff. 140 million cell phones get thrown out worldwide each year and those phones contain hundreds of chemicals that are toxic to humans and damage our environment.

For this project, you work as a team of researchers at the Silicon Valley Environmental Protection Agency (EPA). Executives from Apple & Google come to you for research and a plan to clean up the toxins from the millions of old cell phones, computers, & TVs that have been dumped in landfills of Daly City, Redwood City, and San Jose. In order to develop a clean-up plan you first need to design and conduct an experiment using Fast Plants to remove e-waste toxins from the landfills.

Figure 1. Bioremediation overview from the Summit Learning Platform.

The above material (Figure 1) shows an overview from the Bioremediation project. The overview page contains essential questions, enduring understandings, and the project description. This is used to guide the learning within this project. It also provides students with a clear understanding of what this project encompasses.

After showing students the original rubrics, I designed and showed the experimental group the edited, student friendly rubrics. I began at skill level 4, which is the lowest passing level, and scored up to an 8, the highest cognitive score. The final edited rubrics were posted in their designated classroom space in Google Classroom.

To measure student achievement, I catalogued student data from the state assessment. The Smarter Balanced Assessment Consortium (SBAC) is the state assessment used in Washington. I gave students a pre-and post-Interim Based Assessment (IBA). After developing

the rubric, two important pre-assignments were given to the student groups. The first is a Google Form discussing the perception of science and Summit Learning. I recorded their responses and use it as initial data. The second Interim based assessment (IBA) is pulled from our state selected examinations. IBAs are a short way to assess how well students will fair when they take the state science exam.

In addition, I compiled a list of student surveys to measure perception of the platform. This was also given as a pre and post assessment. Finally, I conducted student interviews to gather responses related to the changes I introduced. Although there is concern for bias, I did feel that it was important to gather firsthand accounts to the treatments that I had made. To self-assess my growth and inform my practice I self-administered my own survey designed on Google Forms. I did this every week starting Oct 5th. I wanted to collect and analyze this data as I progress through each week introducing the treatments.

After students finished the projects, another round of IBA and Google Forms was given as post assessment data points. Additionally, I gathered a subset of student interviews pulled from both groups. This included in video recorded evidence over Zoom, which I transcribed. The following methodologies can be found outlined in the table below (Table 2). To ensure the validity and reliability of my instruments, I used professional reviewed instruments that best suited the construction of my research.

Table 2. Data Instruments Matrix used for the research project.

Research Question	Method and Explanation	Method and Explanation	Method and Explanation	Method and Explanation
Main Question: How will modifying cognitive rubrics to be more student-friendly in the Summit Learning Platform lead to increased student achievement?	Grade on final project Can determine if students are using the cognitive rubrics effectively to get above their grade targets.	Field notes Observation tool done by teacher (or aide if in room) Can be used to determine how students do on assignments related to their time on task for that activity	Pre/Post IBA for SBAC state assessment scores. Do students develop significant growth before and after understanding cognitive rubrics.	
Sub-Question: What correlation is between student achievement and the cognitive rubrics?	Survey Tool to gain student opinion about their interest in the unit 1st hand input about what the students really feel about the topic being covered	Student work samples Data collected on student checkpoints. Teacher may be able to make predictions on where they can improve on their final project.	Student Interview Tool to gain student opinion about their interest in the unit 1st hand input about what the students really feel about the topic being covered	Self-Assessments in the project checkpoints. Can determine if students are using the cognitive rubrics effectively to get above their grade targets.

Table 2 Continued.

Sub-Question:	Interview	Field Notes	Survey	Self-Assessments in the project checkpoints.
How will using student friendly language increase student perception of the platform?	Tool to gain student opinion about their interest in the unit 1st hand input about how much effort the student feels they put into each task Given at the end of the term.	Observation tool done by teacher (or aide if in room) KWL chart? Can be used to determine how students do on assignments related to their time on task for that activity	Tool to gain student opinion about their interest in the unit 1st hand input about how much effort the student feels they put into each task	

Timeline

The timeline (Table 3) was tentative schedule of the proposed project plan. However, I met the each of these goals throughout the project (Appendix B). This follows the project: Bioremediation. It shows the checkpoints leading up to the final project and which power focus areas are associated with those checkpoints. This serves as a syllabus for my action research. Here, you can also find which cognitive rubrics are tied to which section of the project. This clarifies how the cognitive rubrics are grading each portion of the projects.

Table 3. Timeline plan for action research.

<u>Checkpoint</u>	<u>Instrument</u>	<u>Power Focus area</u>	<u>Tentative Schedule</u>
Write A Lab Report Introduction	Pre IBA's, KWL Field Notes, Pre-Student Survey, Weekly Teacher Survey	Climate Change Basics	Oct 5 th to Oct 9 th
Cognitive Rubrics that need to be modified: Asking Questions, Predicting/Hypothesizing, and Introduction and Conclusion.			
Write Lab Report Materials and Procedures	KWL Field Notes, Weekly Teacher Survey	Climate Change Basics	Oct 12 th to Oct 16 th
Cognitive Rubrics that need to be modified: Planning and Carrying Out Investigations.			

Table 3 Continued.

Write Lab Results	KWL Field Notes, Weekly Teacher Survey	Ecosystems Dynamics, Functioning, and Resilience.	Oct 19 th to Oct 23 rd
Cognitive Rubrics that need to be modified: Identifying Patterns/Relationships and Interpreting Data/Information to Make Valid Claims.			
Write Lab Report Conclusions	KWL Field Notes, Weekly Teacher Survey	Ecosystems Dynamics, Functioning, and Resilience.	Oct 26 th to Oct 30 th
Cognitive Rubrics that need to be modified: Making Connections /inferences and Explanation of Evidence.			
Finalize Lab Report	KWL Field Notes. Weekly Teacher Survey, Post IBA's, Post Student Surveys	Extra time for missing work.	Nov 2 nd to Nov 6 th
Take the time to review all 8 modified cognitive rubrics with the class.			
Enrichment Week.	Weekly Teacher Survey, Student Interviews, Final Project Grade. Student Work Samples	Extra time for missing work.	Nov 9 Th to Nov 13 th
Take the time to compile all the data collected from the students and organize the information for later.			

The research methodology received an exemption from Montana State University's Institutional Review Board (Appendix A).

DATA ANALYSIS

Overview of Methods

The instruments I analyzed are the initial student surveys for the comparison group whole class data and the experimental group whole class data. Additionally, I examined the Lexile analysis for the cognitive rubrics. This is done by using a Lexile text generator found online. Another piece of data I examined was the preliminary data for the Smarter Balanced Assessment Consortium (SBAC) Interim Based Assessment (IBA) for a subset of the class. These were initially collected and presented some valuable information. My goal was to share my next steps and the accompanying data gathered thus far. Additionally, I looked at that same subset of students and analyze their scores on the cognitive rubrics.

The student surveys were organized via Google Classroom. This allowed me to consolidate data on the platform. There are a total of 20 students in both of my Biology A classes (Table 1). Of the 20, I received 13 responses to the initial survey. The survey was administered the first day of treatments and conducted safely from their homes. After the treatment was introduced, another round of the same survey was conducted in the final week. Students were reminded to provide honest feedback related to their project and views on science.

The IBA's were initially administered to six students, three from each class period. That was conducted on October 16th and consisted of a total of 10-12 questions. The platform is a secure site, and the questions were developed by SBAC. The test I selected was titled High School ELA- Research: Analyze and Integrate Information (FIAB). This test matched closely to the project the students were conducting through Summit Learning Platform and was the best fit from the selection of interim tests. In addition to valuable data, the IBA's allow students at my school valuable practice for any future state testing through SBAC. Another round of the IBA

was administered to the same students at the end of the treatment. This provided me with the data for comparison.

Data Results

The first set of statistics comes from the student surveys. I've taken the data collected by Google Forms and created my own combined data and figures for parts of this analysis. (Appendix B). There are a couple of important data points that I will discuss as they relate to this analysis.

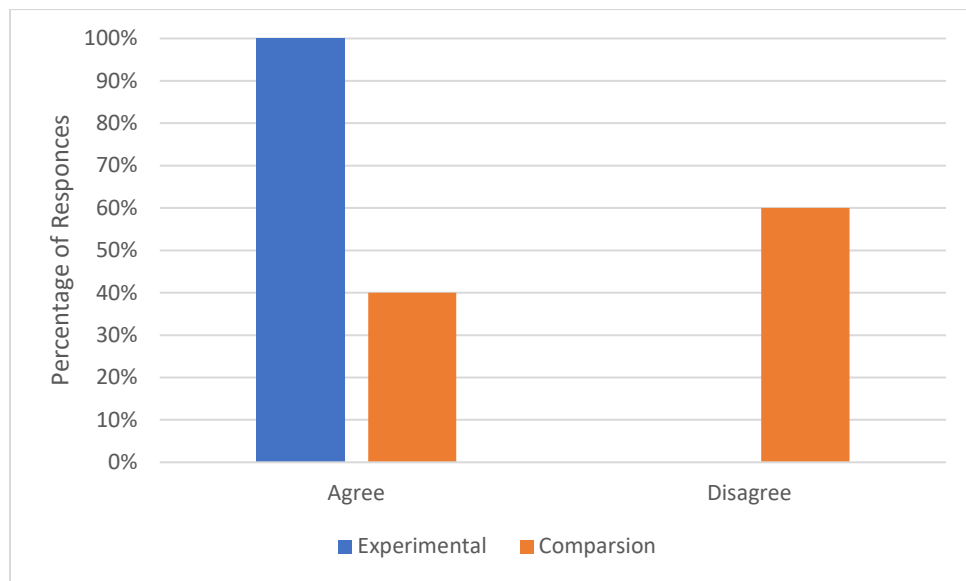


Figure 2. Learning from Summit has been a positive for student learning (Before Treatment), ($n=12$).

The first interesting piece of information comes from the fact that my experimental group has a much better perception of Summit, than my comparison group (Figure 2). Here, we can see that the comparison group has mixed responses when it comes to using Summit as their curriculum. 60% of the comparison group says that Summit has not been a positive experience.

When examining their responses before the treatment, we can see significantly more negative responses in the comparison group (Appendix C). For example, “I don’t like Summit” was a comment made by a student in the comparison group. This could be explained by the class demographic. In my comparison group, I have many returning students to our school having had experience with the previous curriculum. The transition to using Summit has been much easier for new students, which I have more of in my experimental group. This means that regardless of the changes made to the cognitive rubrics, students in my first period class already had a positive outlook on using Summit for their learning.

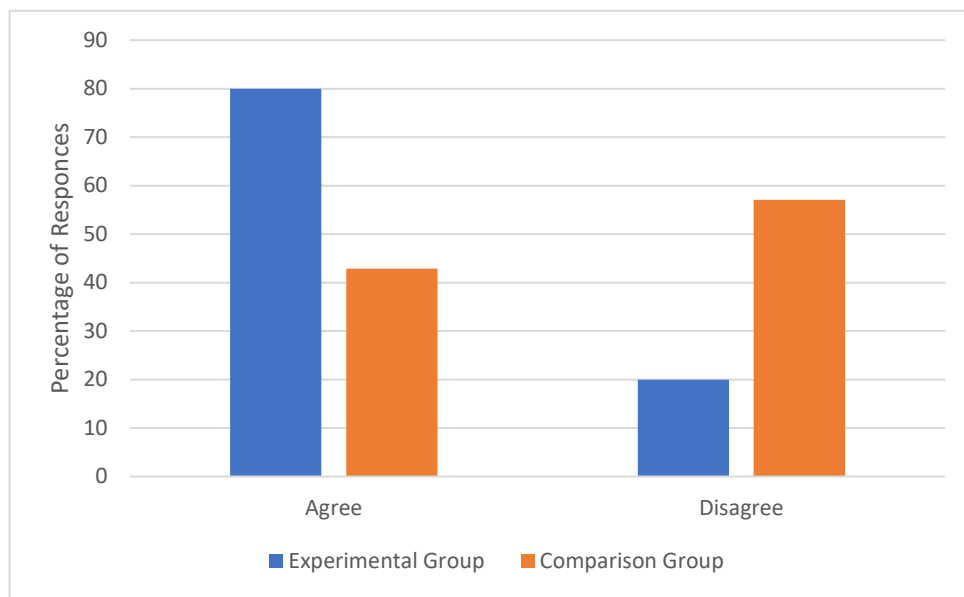


Figure 3. Learning from Summit has been a positive experience (After Treatment), ($n=12$).

In the survey following the treatment you can see a reduction of the group of students who “agree” that Summit has been a positive experience in the experimental groups’ responses. This is most likely because many of our new students initially found the platform challenging in the beginning, but user friendly and manageable after having a few months of using it. However,

what surprised me was the number of responses that changed in the comparison group from 40% to about 43%. Perhaps some students had a shift in their experience with Summit and found it to be more enjoyable after having a full year using it.

Other data that I want to discuss from the student survey comes from their understanding of how to use the cognitive rubrics. Overall, a majority of students don't understand how to use the cognitive rubrics to achieve mastery (Figure 4). In Summit, this is a fundamental understanding in order to effectively complete any project. Of the 13 responses, only 4 students felt confident understanding how these directly relate to the final products. This is positive because it tells me how important my research project is in helping students develop a functional understanding of the grade/rubric marriage.

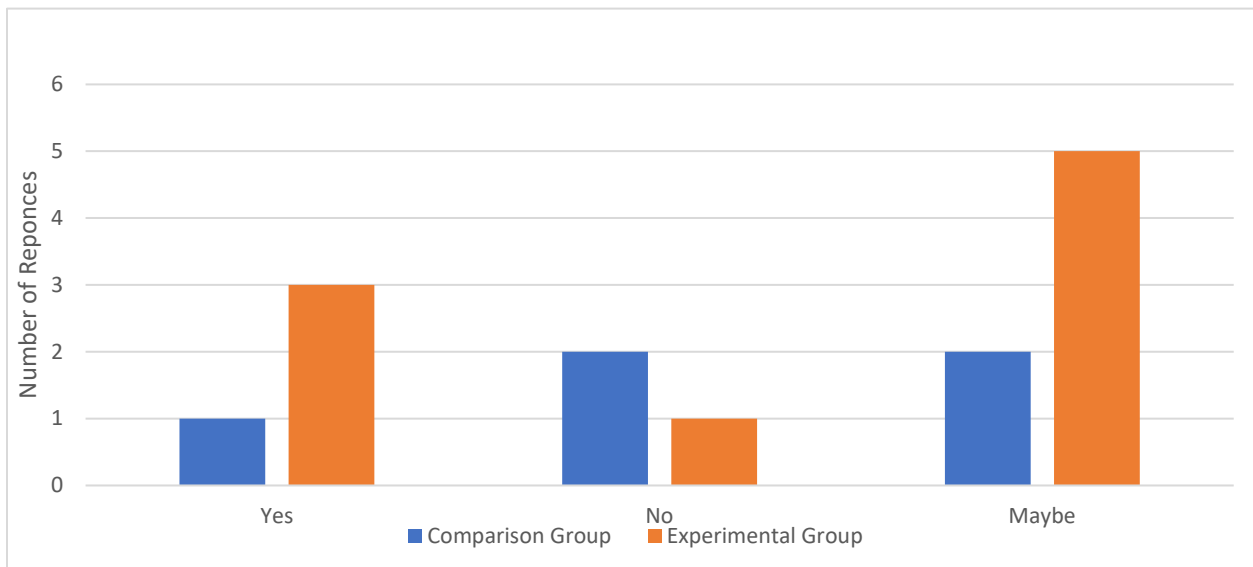


Figure 4. I understand how rubrics affect my final grade (Before Treatment), ($n=14$).

After the treatment I see these numbers change in an unexpected manner. To start, we see that the experimental data shows students do not fully comprehend how to effectively apply the rubrics in achieving an overall grade (Figure 5). However, there is a reduction in the “maybe

category” indicating the experimental group might have more questions about how the rubrics affect the final grade after the initial treatment was given to them. The opposite happened for the comparison group. More students moved towards comprehension regarding how the rubrics affect the final grade. This was an unanticipated result.

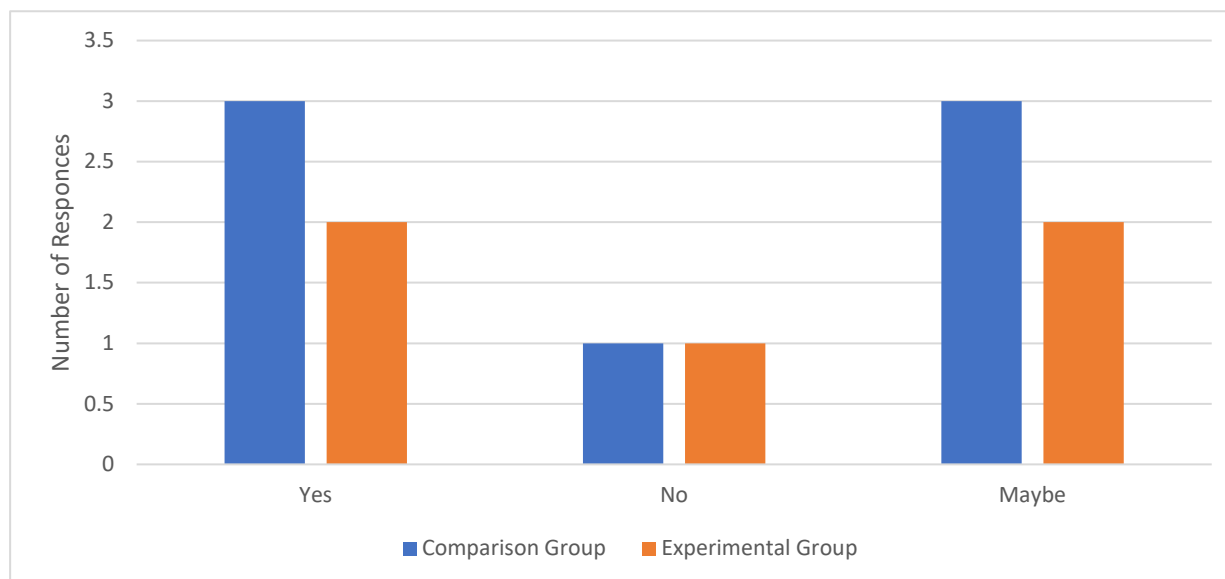


Figure 5. I understand how rubrics affect my final grade (After Treatment), ($n=12$).

Lastly, I want to highlight the revelation of more important information gathered by the Google Form. Particularly, the last question of the survey, which allowed students to select common responses (Appendix B). It is clear from this data, that most students can't clearly identify how they are graded in Summit and would benefit from an increased understanding of how the rubric dictates their final grade via the Summit Learning Platform.

It's also important to recognize that of all the data gathered by the students the most promising was the change in student's perception of science. My experimental data shows that by the end of the treatment all students said that they enjoyed science. I also saw an increase in the comparison group data for this question as well. This could be because students are finding

the Summit curriculum enjoyable particularly for the subject of science. Another striking observation regarding survey data suggests that the students did learn how to effectively participate in the feedback cycle (reviewing and resubmitting work) on the platform after the treatment (Appendix B). This is important and is something our school is continually striving to improve as grades are fluid and can be increased after students engage in the feedback cycle (Tavernner, 2019).

The next set of data to consider relate to the changes to the cognitive rubrics. After much deliberation, it was determined that running the rubric through a Lexile calculator would identify necessary changes needing to be made on the cognitive rubric (Appendix D). This calculator analyzes text to determine Lexile score. Lexile scores are a way to determine level of ease or difficulty in a text for students in differing grade levels. They are presented in ranges based on length and vocabulary within the text.

Table 4. Lexile ranges for the Cognitive Rubrics.

<u>Cognitive Rubric</u>	<u>Lexile Range Unedited</u>	<u>Lexile Range Edited</u>
Asking Question	1210L-1400L	810L-1000L
Predicting/Hypothesizing	1010L-1200L	610L-800L
Introduction and Conclusion	1010L-1200L	810L-1000L
Planning and Carrying Out Investigations	1210L - 1400L	610L - 800L
Identifying Patterns and Relationships	1210L - 1400L	810L - 1000L
Interpreting Data/Information to Make Valid Claims	1010L - 1200L	610L - 800L
Making Connections and Inferences	1010L - 1200L	610L - 800L

In the table above, you can see the Lexile scores from my edited versions rank at a lower Lexile level (Table 4). This is positive because this provides evidence that my language is more student friendly than the rubrics Summit provides. Students would have to be reading at a 12th grade reading level (or higher) to be able to understand the rubrics provided by Summit. My levels are around an 8th-9th grade reading level. This is appropriate to their age range and much easier to read, comprehend, and apply. Changes to the rubrics can be observed in the table provided (Appendix D). On average you can see that my ranges are significantly lower, which is more accurate to the students reading levels (Figure 6). There is some variation in the number based off the recommended vocabulary and size of the text. I tried to keep my lowest Lexile in the 610 to 810 range.

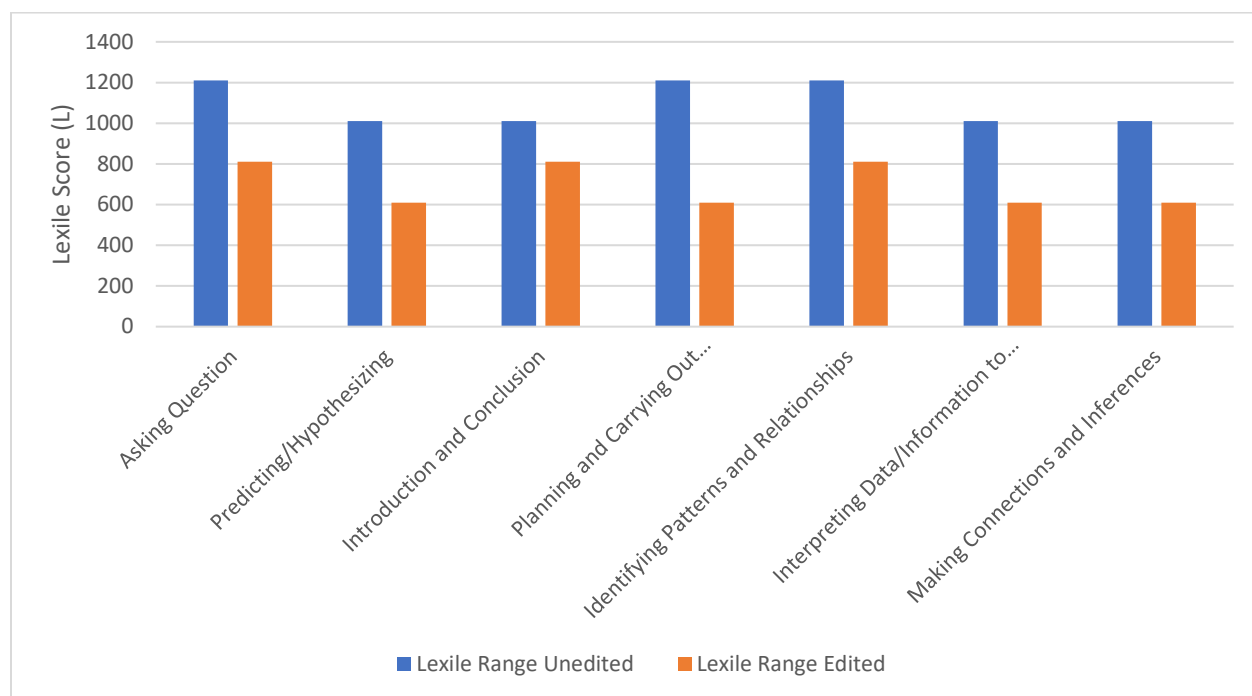


Figure 6. Lexile ranges for the edited and unedited Cognitive Rubrics.

Next, I share the preliminary data gathered from the SBAC Interim Based Assessments. The IBA's are a short, standardized test that I administered twice to sub-groups of students. I gathered a total of six scores, three from each group (Appendix E). My goal was to compare how this data changed after introducing the treatment and to look at how this relates to the students score on the cognitive rubrics.

Initially looking at the data it appears that the experimental group didn't gain any further ability on the SBAC Interim Bases Assessment after the treatment was applied (Figure 7). However, Lilyonna did see some growth after she had started below standard. This didn't change to meeting standard because she was within the margin of standard error. This slight change is positive because it suggests that the rubrics did help her achieve growth. She even mentions in the feedback she gave that she enjoyed using the rubrics for her learning because they helped (Appendix F).

Furthermore, looking at the breakdown of her cognitive rubric I see her score, on average, was 5 which was one point above the minimum of 4. (Figure 9). This suggests that perhaps even though she didn't meet the standard on the IBA, she did meet the standard on our final assessment in Summit and that might account for her increased score the second time she was administered the IBA. Even though there was a decrease in the other participants IBA scores, I did see an increase in their average cognitive skill score. Each of them scored a 5 or above which is meeting/exceeding standard.

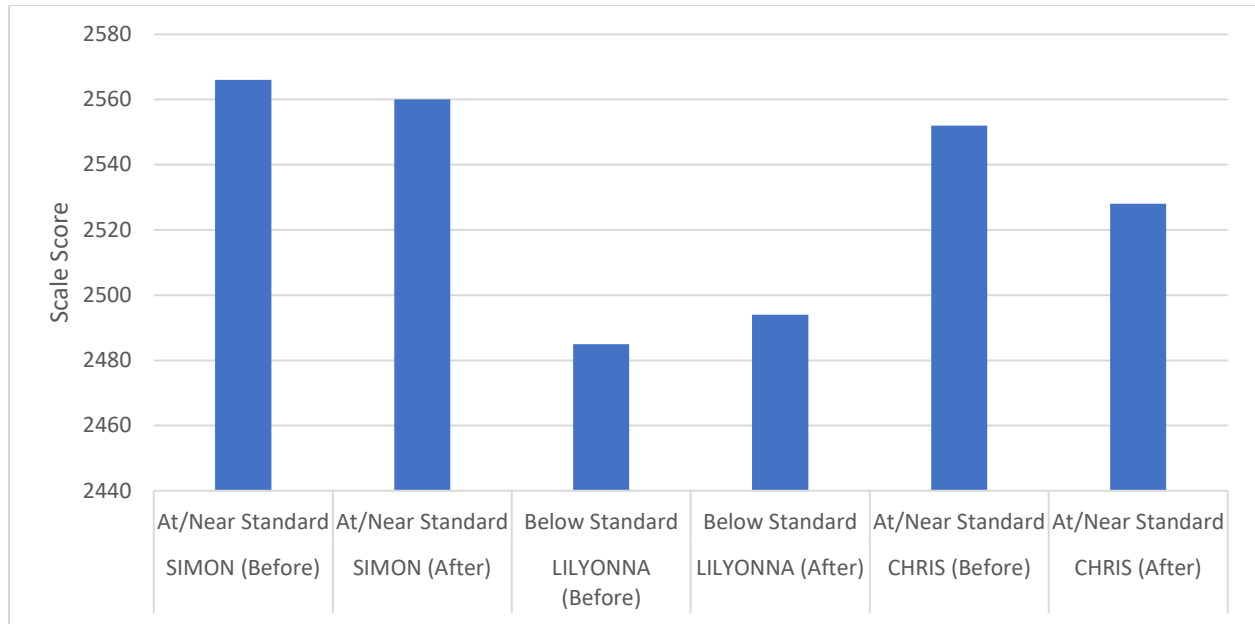


Figure 7. The experimental group IBA Scale Scores.

In contrast, the comparison group continued to have unexpected quantities of data. Two of the three participants made significant growth in their IAB scores. Nevertheless, while this might appear as an improvement, compared to the experimental group they scored lower on their cognitive rubrics. Suggesting that the modifications to the rubric did make an impact. The improvements to the IBA also suggest that there could be another variable involved that is increasing scores.

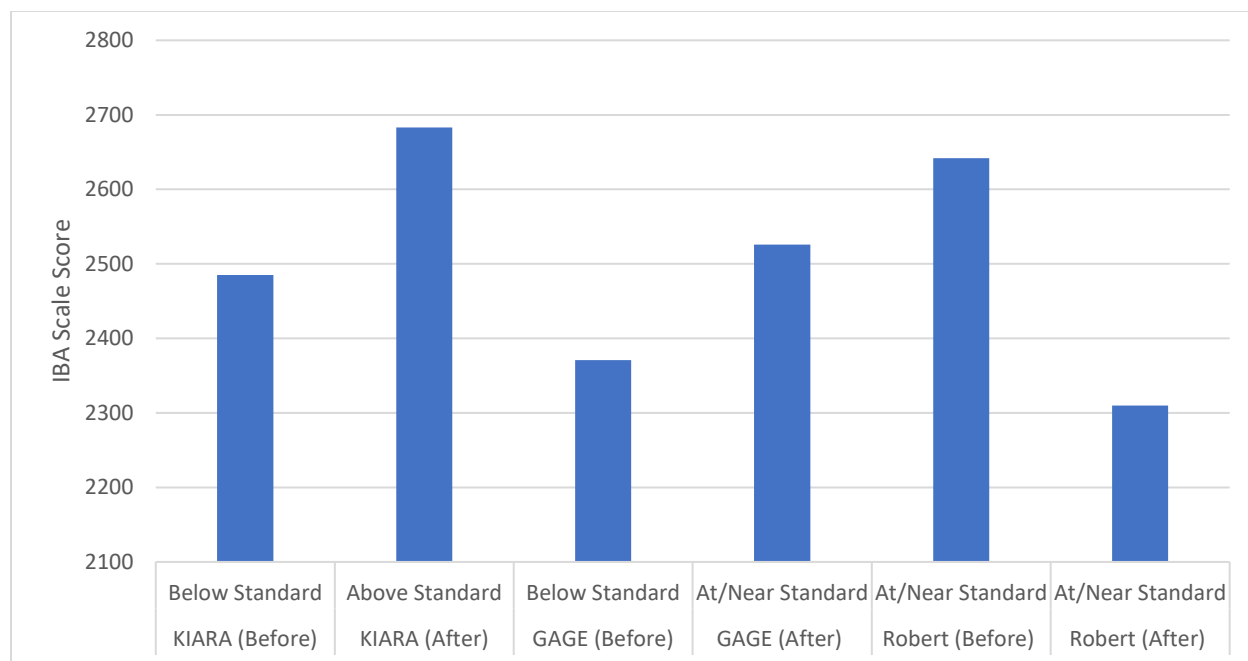


Figure 8. The comparison group IBA Scale Score.

Overall, comparing these two snippets of data are important because they are the two major assessments students will encounter at school. It's also important to note the grade difference between the comparison group and experimental group. On average I had more 9th grade students in my experimental group, while I mostly had 10th graders in my comparison group. This suggests that my 10th graders may have acquired more information from their other classes leading to the higher IBA scores.

To get a closer look at each individual score the attached table will provide a better perspective on each rubric used (Appendix G). This could be analyzed on the individual rubric level and compared to the SBAC Interim Based Assessment data, which was specific to the topic of Research: Analyze and Integrate Information (FIAB). For my purposes, it was more accurate to take the averages of all the rubrics to show a direct contrast. After applying a two-sample t-test to the final average scores on the cognitive rubric it was found that the t-value is 1.69533 and the p-

value is .083603. The result is not significant at $p < .05$. This suggest that more work would need to be conducted at higher sample sizes.

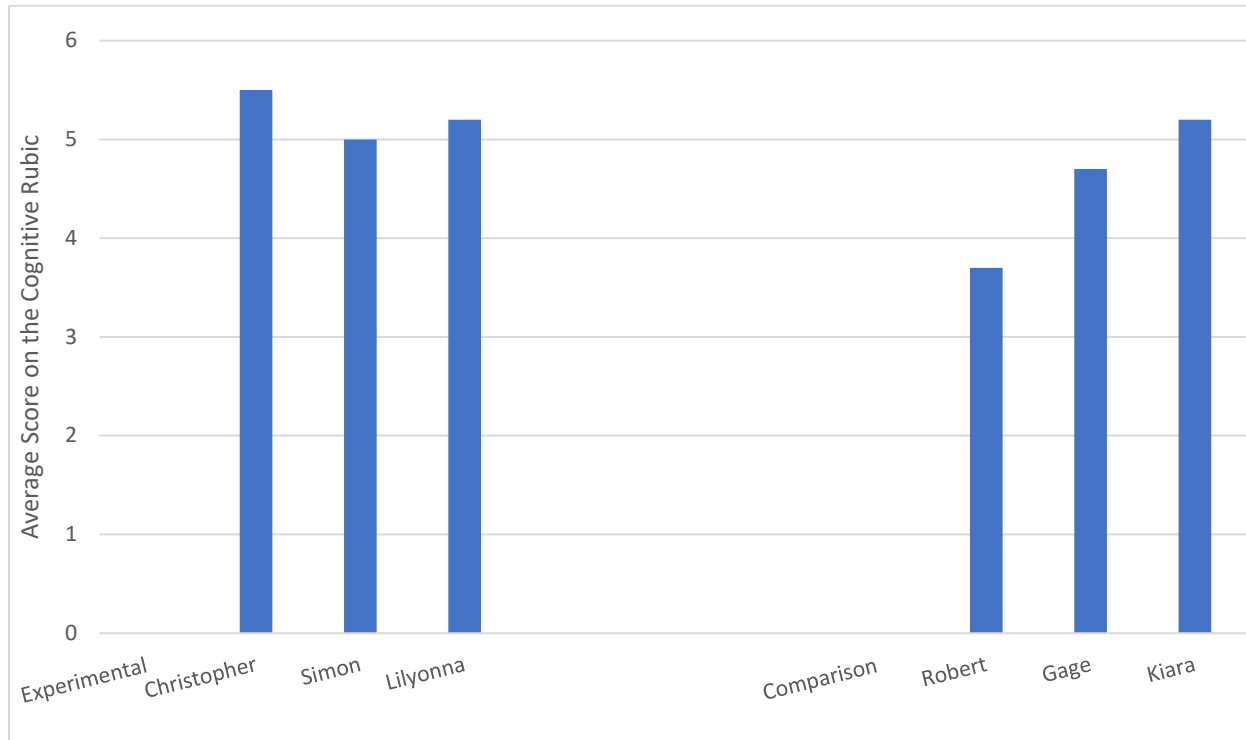


Figure 9. The average scores on all the Cognitive Rubrics.

CLAIMS, EVIDENCE, AND REASONING

Interpretation of Results

The connection between student achievement and cognitive rubrics used to score the projects is supported by the SBAC Interim Based Assessments data gathered and the overall averages on all the cognitive rubrics. It's this data that supports the hypothesis that modifying the rubric leads to higher scores on the final project. The subgroup of students in my experimental group scored much higher than the students in my comparison group. Even though this data isn't supported in the IBA scale scores, modifying the rubrics in Summit provided foundational skill for learning beyond science.

The reason there is a correlation between student achievement and cognitive rubrics is because Summit heavily weights performance on final projects by cognitive skill rubric scores (80% of the students' final grade). Naturally, by modifying the rubrics down to student appropriate Lexile we begin to see a shift to more students achieving at higher levels.

Using student-friendly language improved student perception of the platform by changing their view on the platform and science in general. All of the students in my experimental group finished the class saying they enjoy science. Even the comparison group saw an increase after participating in the class (Appendix B). This suggests that students enjoy learning on the platform and by adjusting the language, they are more confident in their performance.

This is supported by the data because before the treatment began, 50% of the students said they were worried about their final grade. After the treatment 100% of the students overcame that concern. This suggests the changes to the cognitive rubric created clarity for the students in how they would be graded, thus increasing their perception of the platform.

I didn't anticipate my experimental group having a positive experience using Summit already in their learning before introducing the treatment, particularly since last year was such a struggle with regard to students disliking the platform. This shows learners come from all different abilities despite educator intervention attempts. From the feedback provided by students in the comparison group survey, they didn't like Summit initially (Appendix C). However, many responded positively in the final feedback by saying they enjoyed using it (Appendix I and J).

Initial data shows my experimental group has already enjoyed using summit. Besides this unforeseen result, edited rubrics will still be useful for students to experience, and it could have valuable student achievement results in the future. Additionally, it illustrates how much I have learned since beginning my action research. I have an increased knowledge of how the cognitive rubrics are designed and where they can be improved.

The changes to the platform inform and affect my practice by providing me with new motivations and self-confidence. This is supported by the data collected in my teacher polling results (Appendix K). I tracked my changes over the five weeks that I administered the treatment. I saw a steady increase on both my motivation level and self-confidence (Figure 10).

The confidence I gained was related to editing the cognitive rubrics and measuring them with the Lexile ranges. This practice brings a lot of valuable data to my research, and I am excited to share this information with my colleagues particularly because my motivation level grew with this.

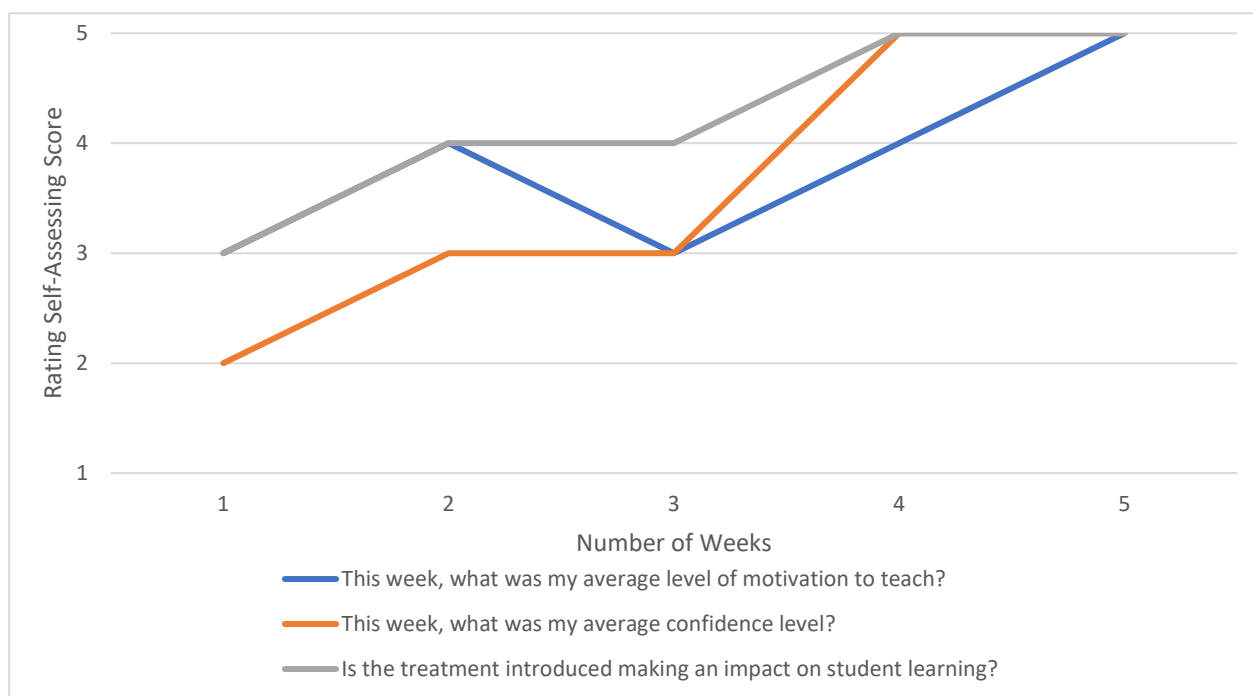


Figure 10. The teacher self-assessment results.

Modifying the cognitive rubrics to be student-friendly in the Summit Learning Platform led to an increase in student achievement. In response to my question about student achievement it was found that achievement is closely tied to their ability to understand the cognitive rubrics. This was achieved by lowering the Lexile score to be grade appropriate while adhering to the original format and style of the rubrics. The overall outcome was higher cognitive skill averages, improved perception of the platform, and of the subject science. In addition, the modification of the platform led to an increase in my own self-confidence and motivation as an educator.

Student's initial dialogue changed as the treatment was introduced. There were many comments made about how much they enjoyed the project they were working on in Summit and how confident they felt with the grading. Although my data was skewed by the inconsistencies of

online learning, there still was conclusive data gathered from the student surveys and their final scores.

Data Collection Method Modification

One of the challenges of teaching online has been encouraging students to submit or turn in work. Additionally, attendance in general is a challenge particularly since having to follow mandatory state guidelines by adopting virtual learning practices due to Covid-19. In a nonvirtual class setting, it would be easier to administer IBAs and student surveys because I could monitor and encourage completion of said instruments. The number of surveys I have collected so far will only improve with time. This also explains my reasoning of choosing a subset of students to conduct the IBA's.

I struggled with wanting to change which group would be receiving the treatment. My comparison group has a lot of animosity toward Summit and has much room for growth. However, I do think that all of my student will benefit from my treatment regardless of their initial perception of the platform.

In the future, I would like to see how this treatment would apply to other Summit classes across content areas. I could see this being used across all of Summit's 36 cognitive rubrics. It would be easy to adapt and implement for other courses. I also see this being implemented at lower grade levels. In fact, they use the same cognitive rubrics to score 4th -8th grade without modifying the language. This change could help prepare younger students for success.

Overall, I feel optimistic that my instruments are appropriate for my questions and will provide valuable data related to my treatment. I'm confident in the connection I have made and the methods I have laid out.

My next steps include applying what I learned to other classes, hopefully in-person. This would allow me to get more survey and assessment data out of students. Additionally, I want to pull individual student work samples to provide more evidence of achievement. For example, I want to track student progress by using feedback given and compare that to student self-assessment through the cognitive rubrics. Lastly, I want to make this research available for Summit to review as it would benefit students around the country who use Summit Learning Platform.

Impact of Action Research on the Author

After applying the treatments and reflecting on the research that was conducted, I've reached several impacts that my Action Research had. The first is the awareness that Summit has positively impacted my school and my students' perceptions on science. Although, the process of implementation of Summit into our school has been challenging it was all worth it in the end. I do recognize the changes that students had to overcome in order to get to where we are now. Even though students didn't initially understand the grading process and the cognitive rubrics the content itself has been an inviting change to our school and I can see how much more rigorous our curriculum is.

Secondly, by focusing on the cognitive rubrics I have forced myself to learn more about grading and how to modify the rubrics to better suit the needs of the students. This is encouraging because I feel confident in sharing this knowledge with other teachers at my school. By laying out clear guidance on the cognitive rubrics, I was able to see on average students' scores increase by 2.5 higher. This is significant because students met those expectations because the rubrics were clear. The other outcome to my project is the knowledge that all 36 cognitive rubrics are written in a Lexile that often exceeds student reading level. Although Summit strides

for high performance and rigor the Lexile level still might be considered challenging to those at college reading level.

Lastly, the final impact was the changes in my own perception of the platform. I found that I grew more confident in communicating the rubrics, thus adding to my competency in understanding the projects I am selecting for students. This has opened the door for me to modify and create my own projects for future classes. If my research has any impact outside of my school, it will be permanent changes made to the cognitive rubrics via the whole Summit Platform. I envision them making the changes accessible at all grades across every school. To do this they will need to consider Lexile level and make informed changes that will have lasting impacts.

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APPENDICES

APPENDIX A

IRB CERTIFICATE

INSTITUTIONAL REVIEW BOARD

For the Protection of Human Subjects FWA 00000165

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Chair: Mark Quinn

c/o Microbiology & Immunology

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MEMORANDUM

TO: Drake Haren and Walter

Woolbaugh

!

FROM: Mark Quinn 7174k c.yj

Chair, Institutional Review Board for the Protection of Human Subjects

DATE: October 23, 2020

RE: "Increasing Student Achievement through Modification of Cognitive Rubrics in the Summit Learning Platform" [DH102320-EX1]

The above research, described in your submission of October 7, 2020, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

x Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public

behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation; and (iii) the information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by section 16.111

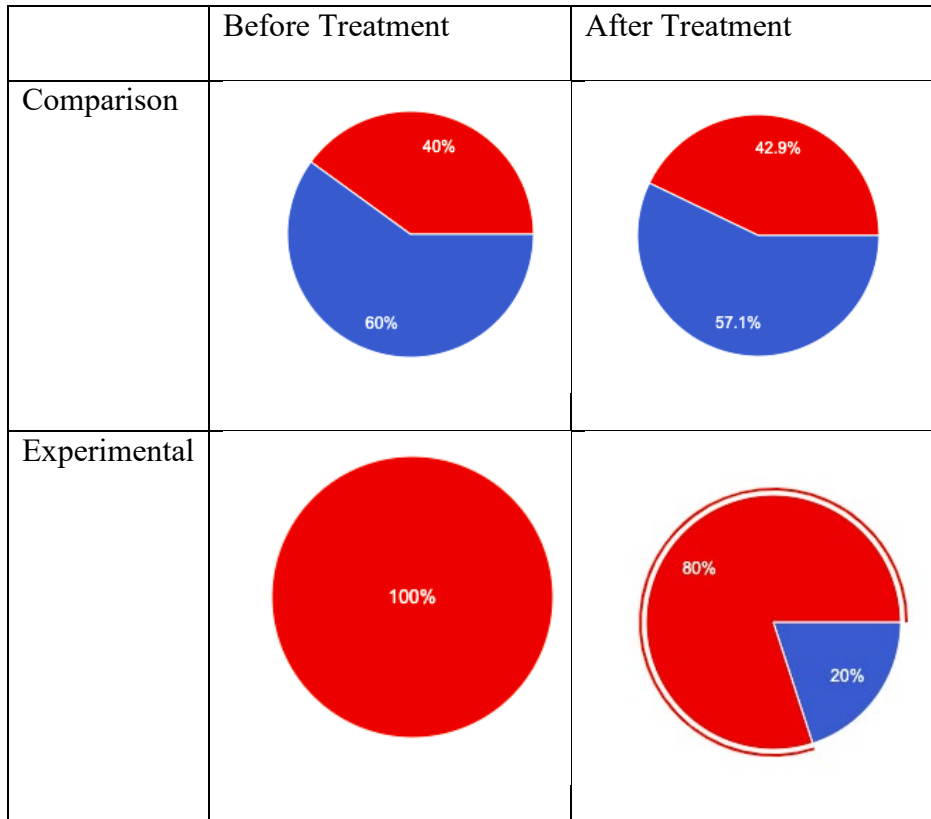
- b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.

APPENDIX B

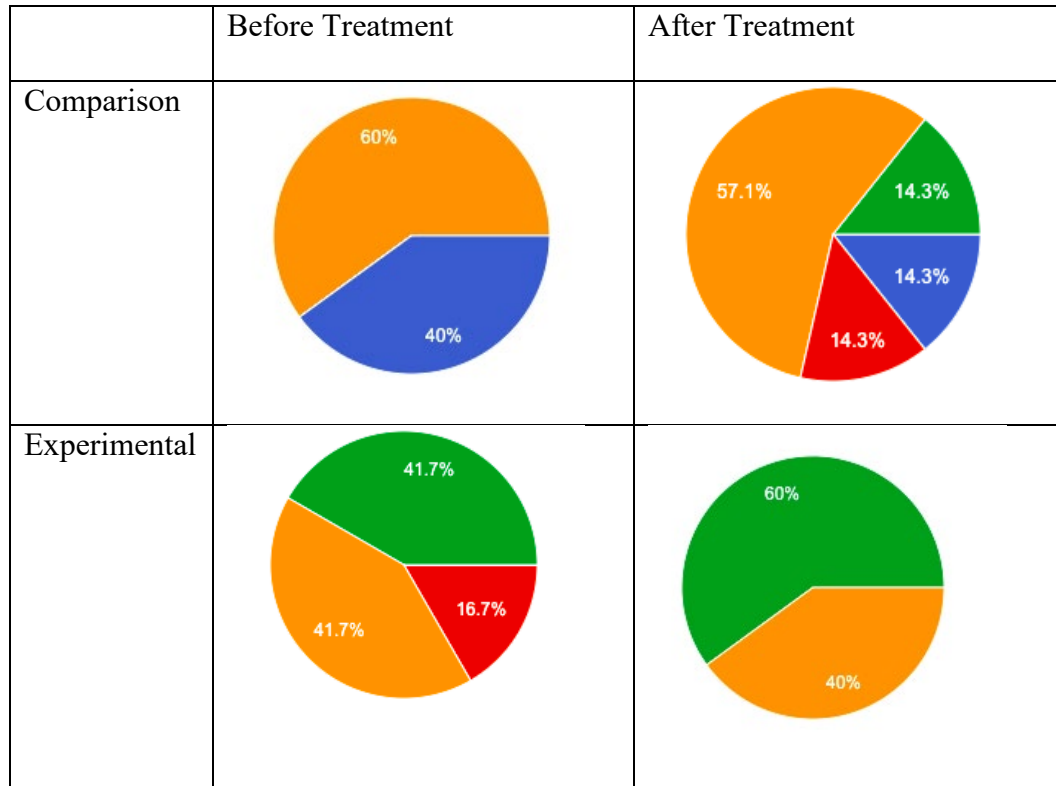
COMBINED STUDENT SURVEY DATA

Learning from Summit has been a positive experience.



● Disagree
● Agree

In the future, I will learn and enjoy using Summit for my classes.

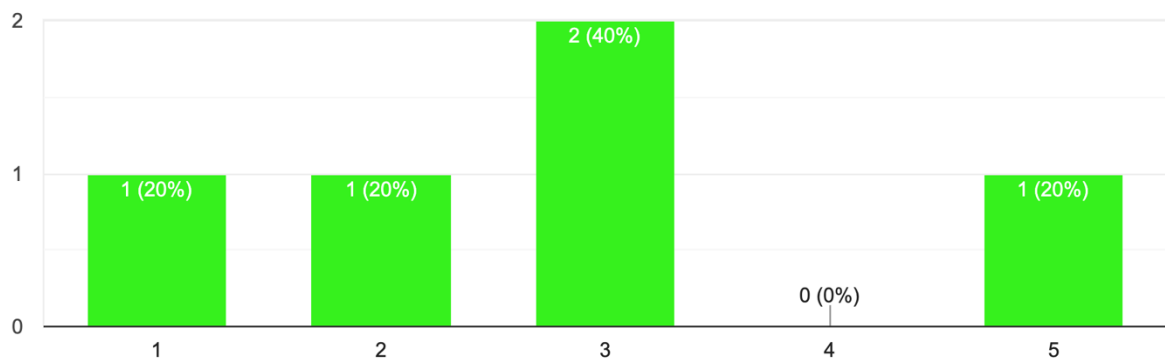


Comparison Group

Before Treatment

Rate how confident you were using the cognitive rubrics on our last project (My Science Identity)?

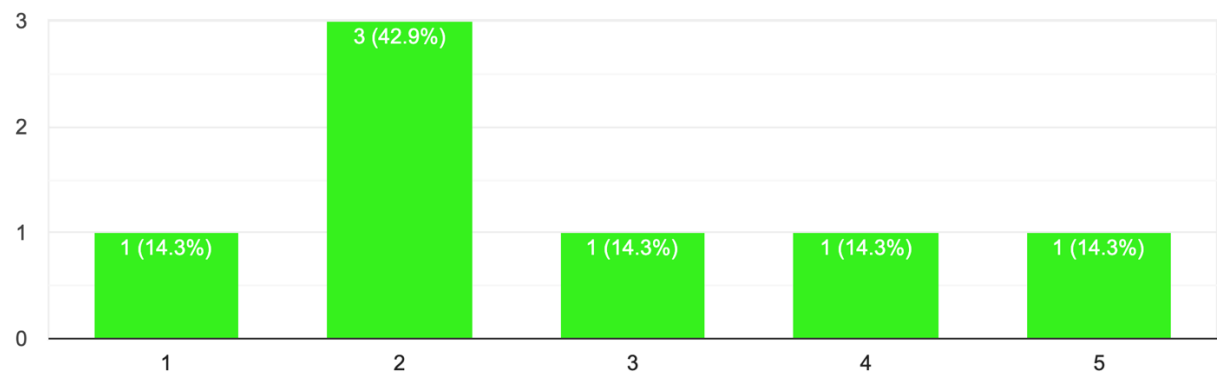
5 responses



After Treatment

Rate how confident you were using the cognitive rubrics on our last project (My Science Identity)?

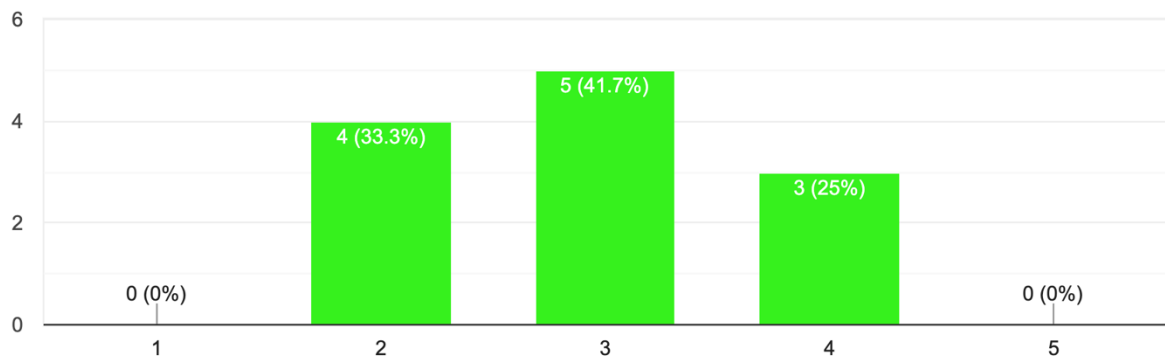
7 responses



Experimental Group

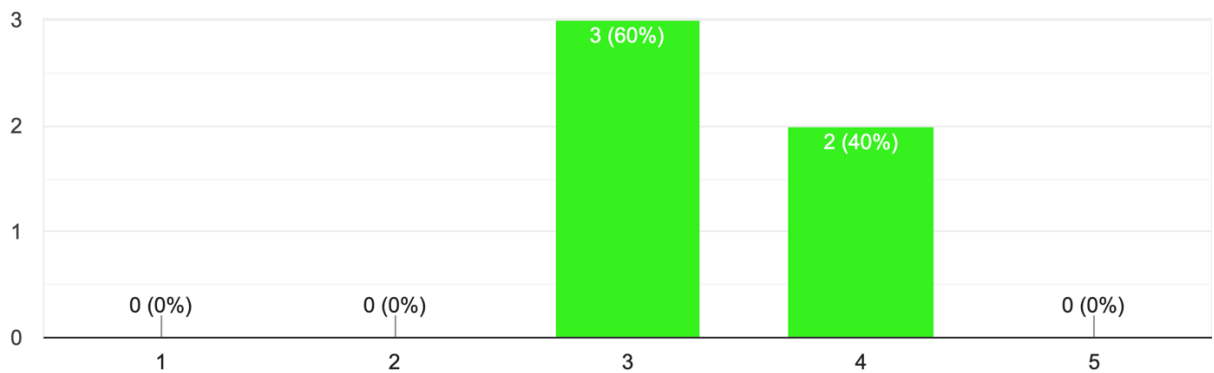
Before Treatment

Rate how confident you were using the cognitive rubrics on our last project (My Science Identity)?
12 responses

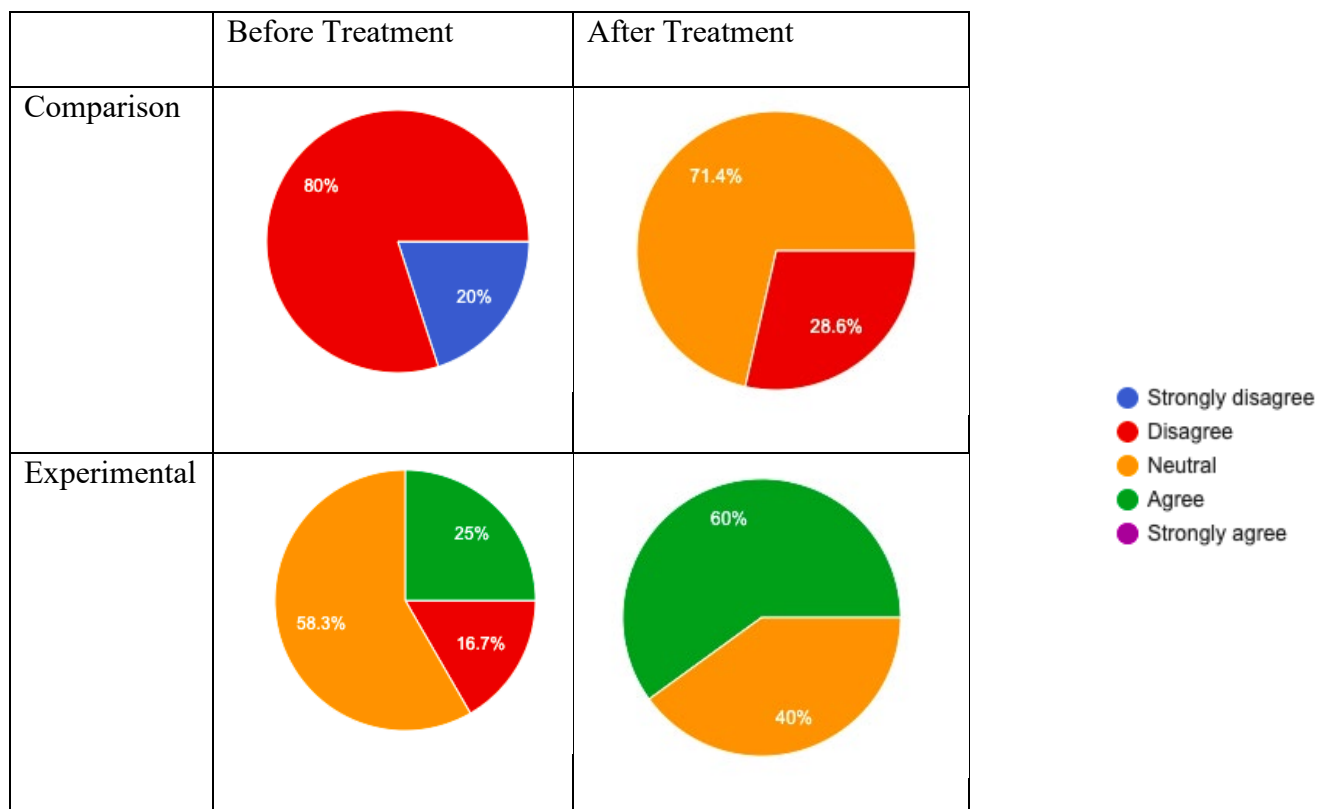


After Treatment

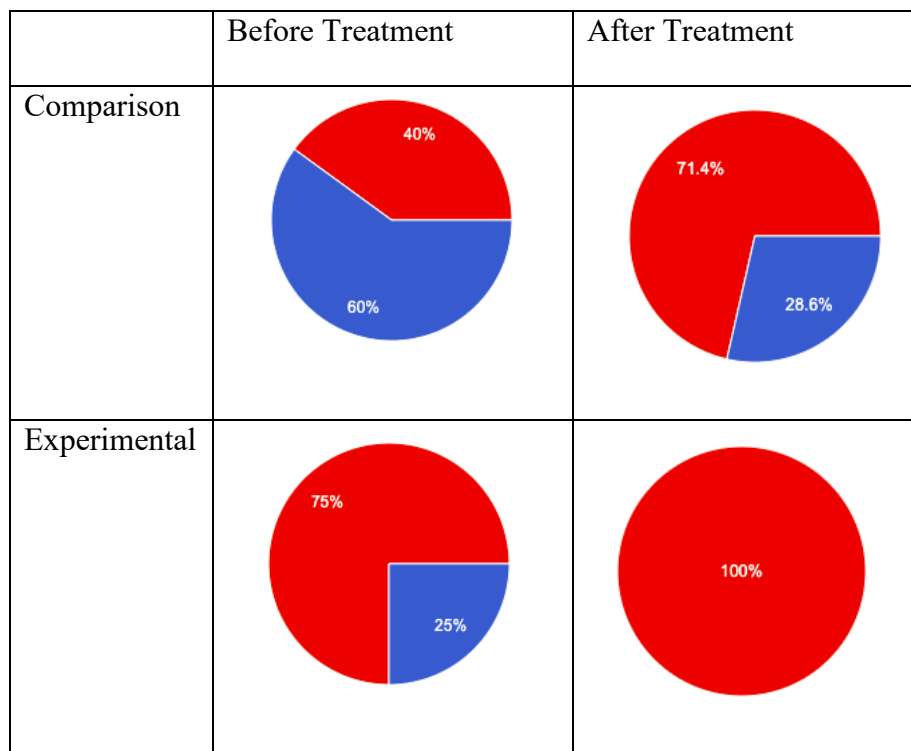
Rate how confident you were using the cognitive rubrics on our last project (My Science Identity)?
5 responses



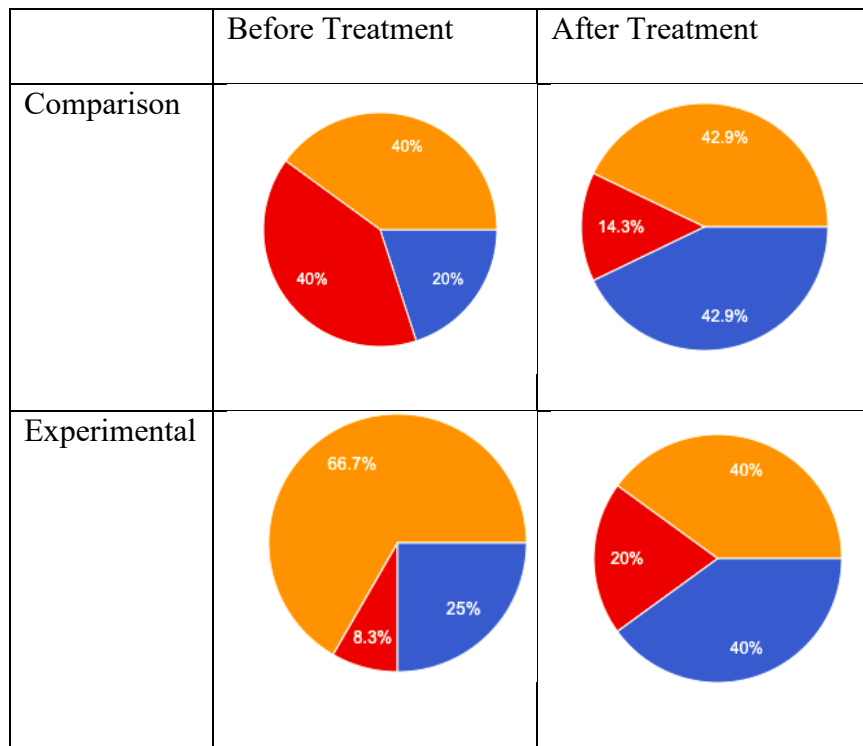
Summit Learning Platform has improved my learning in Science (Biology).



I enjoy science.

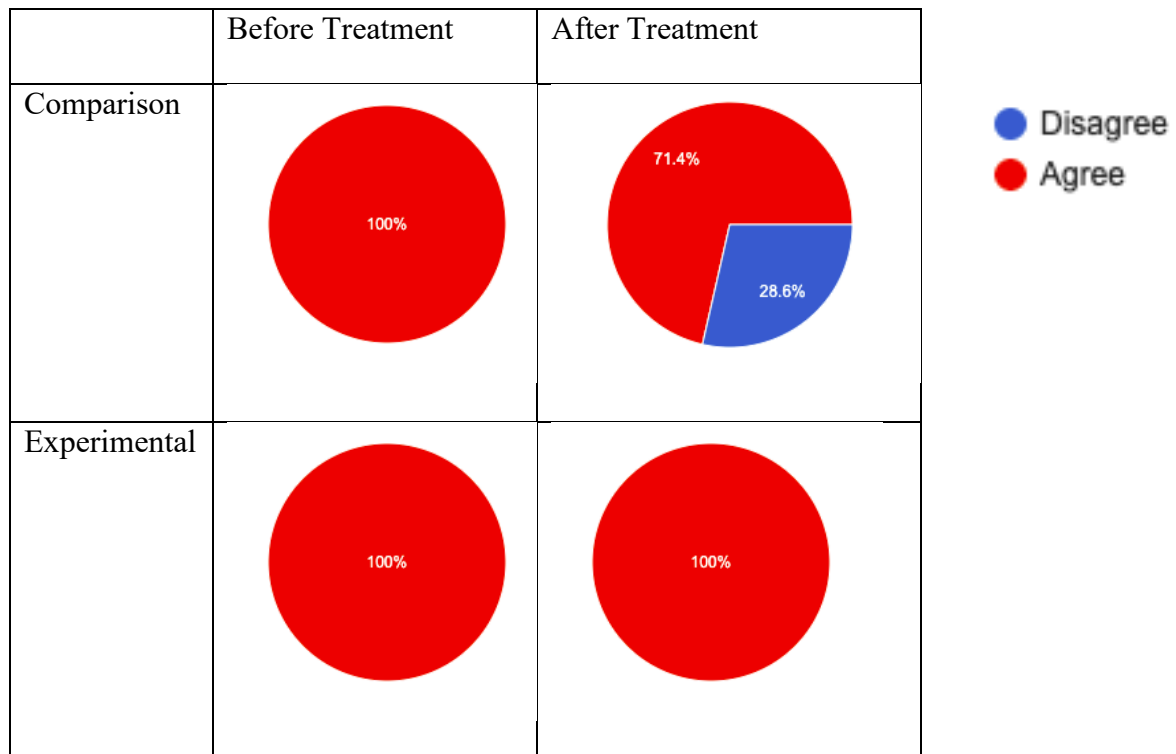


I understand how cognitive rubrics are used to determine my grade for final products.

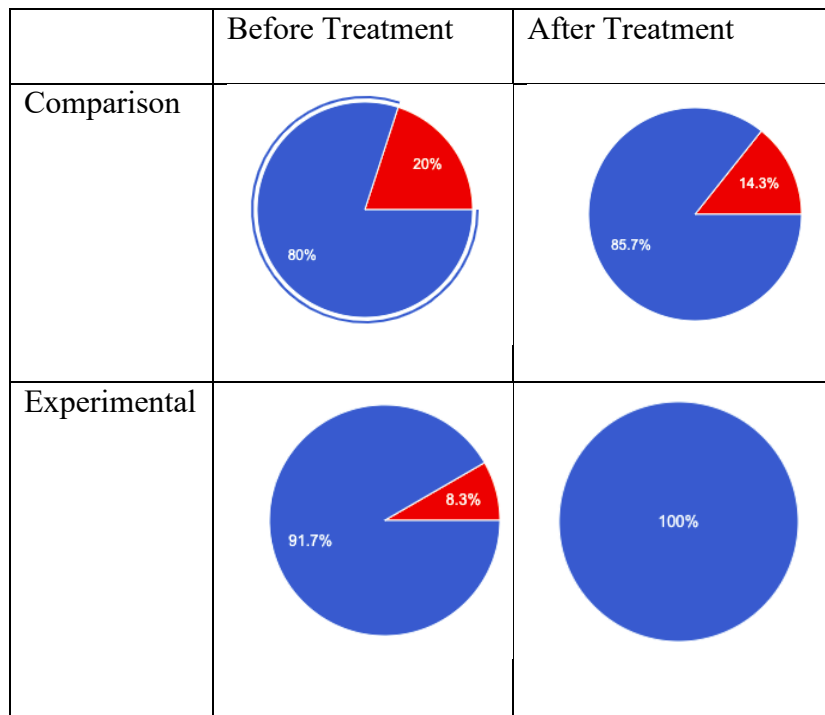


● Yes
● No
● Maybe

I know how to access my projects and submit feedback.

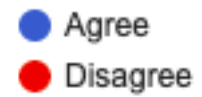
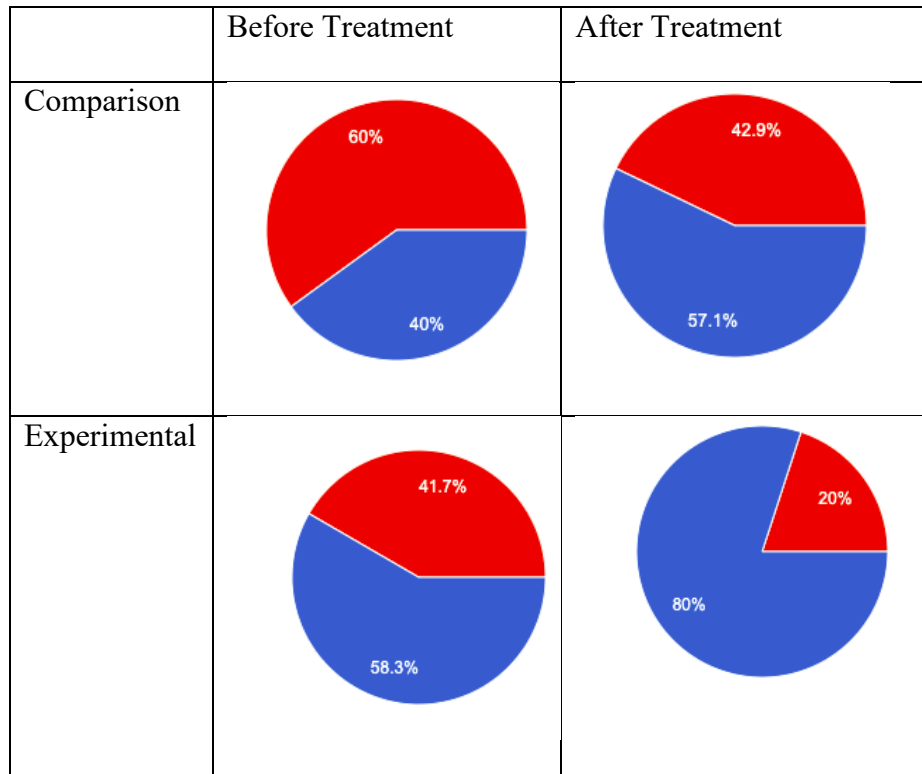


I review, fix, and resubmit my feedback on projects.



● Agree
● Disagree

I have used the cognitive rubrics when self-assessing my own work.



APPENDIX C

PRE-QUALITATIVE RESPONSES FROM STUDENTS

<u>Experimental Responses</u>	<u>Comparison Responses</u>
using goal setting helps reminds me to get assignments done. its also easier to find assignments. easier to understand the material using summit is a positive thing because its easy Learning from summit has been pretty easy, at first i found it confusing and frustrating. But as the weeks go by, it gets easier. I've learned how it works pretty well. it's been quite easy and simple to use and learn Summit is easy to use and very easy to understand. no it is fairly easy to navigate and helps me understand the subject a little bit.	confused with assignments I just don't like summit Summit makes thing straightforward and easy to access. I like summit dont get me wrong but its just hard finding documents or whatever bc like there be so many things under one cool down/class/tab I don't learn anything online.

APPENDIX D

UNEDITED AND EDITED COGNITIVE RUBRICS

Unedited	Lexile Range	1210L - 1400L		
Inquiry: Asking Questions	3	4	5	6
Developing focused answerable inquiry and research questions.	Questions are relevant to a specific topic, are testable or researchable, and build on prior knowledge about the topic.	Questions are relevant to a specific topic, are testable or researchable, and build on disciplinary knowledge about the topic.	Questions are valid, testable or researchable, and based on observed patterns and/or research.	Questions are valid, focused, testable or researchable, and based on observed patterns, current research, and/or a specific model or theory.

Edited	Lexile Range	810L - 1000L		
Inquiry: Asking Questions	3	4	5	6
Developing focused, answerable	Write a testable question but it <u>lacks relatability</u> to the project.	Write a testable question that relates to the project. The	Write a testable question that relates to the project that is	Write a testable question that relates to the project. The

inquiry and research questions.		question is not open-ended.	open-ended but lacks a connection to a world problem.	question is open-ended and fits a current world problem.
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Unedited	Lexile Range	1010L - 1200L		
Inquiry: Predicting/Hypothesizing	3	4	5	6
Developing hypotheses and predictions related to the inquiry, research question, or investigation.	Makes a reasonable prediction related to the inquiry question that involves changing a variable. Begins to explain reasoning for prediction by	Makes a reasonable prediction related to the inquiry question that involves changing a variable. Hypothesis relates to prior research	Constructs a testable hypothesis about the investigated question, with a basic description of the variables. Hypothesis relates to observation, research, or	Constructs a clear, testable hypothesis about the investigated question, with an accurate definition of the independent and dependent variables. Hypothesis is

	relating it to prior knowledge, such as cause and effect relationships.	about the topic.	scientific principle.	based on observation, research, scientific principle, model, or theory.
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Edited	Lexile Range	610L - 800L		
Inquiry: Predicting/Hypothesizing	3	4	5	6
Making a hypothesis and prediction related to the inquiry, research question or investigation.	Makes a prediction and a hypothesis but keeps them together and not separated. Missing a statement or connection to the project.	Makes a prediction and hypotheses as separate statements. The prediction is an if/then statement. Hypothesis is a causal statement. <u>Both lack</u> clear connections to the project and real-	Makes a prediction and hypotheses as separate statements. The prediction is an if/then statement. Hypothesis is a causal statement. <u>Only one lacks</u> clear connection to the project and	Makes a clear prediction and hypotheses as separate statements. The prediction is an if/then statement. Hypothesis

		world problem or could use editing.	real-world problem or could use editing.	is a causal statement. Both relate clearly to the project and real- world problem.
--	--	--	--	---

Unedited	Lexile Range	1010L - 1200L		
Introduction and Conclusion	3	4	5	6
Framing a composition with a relevant introduction and conclusion.	Introduces the topic and a clear main idea or claim; maintains a consistent focus on the main idea or claim. Provides a concluding statement or	Introduction includes related background or context information about the topic and introduces the main idea(s) or claim(s). Conclusion	Introduction includes relevant background or context information about the topic, introduces main idea(s) or claim(s), and establishes purpose for	Introduction includes relevant and sufficient background or context information about the topic, introduces main idea(s) or claim(s), and establishes purpose for writing; introduction is engaging.

	conclusion that relates to the main idea or claim.	logically follows from the content presented and ties back to main idea(s) or claim(s).	writing. Conclusion summarizes the content presented and pulls multiple ideas together in relation to the main idea(s) or claim(s).	Conclusion summarizes, pulls ideas together, and highlights important points of the content presented; when appropriate, conclusion considers some implication(s) of the content presented.
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Edited	Lexile Range	810L - 1000L		
Introduction and Conclusion	3	4	5	6
Framing a composition with a relevant introduction and conclusion.	Introduction includes a clear main idea that relates to the project.	Introduction includes background information about the project, as well as a valid connection to the project.	Introduction includes an appropriate background with clear main idea and writes with purpose.	Introduction has an understandable and clear background including several examples of other projects. Defines useful vocabulary. Has a very clear purpose.

	Provides a concluding statement that relates to the data collected.	Provides a concluding statement that is understandable and ties back to the project's main idea.	Conclusion summarizes the project and pulls multiple examples of ideas as they relate to the project.	Conclusion clearly summarizes and pulls multiple pieces of evidence to support/not support the hypothesis.
--	---	--	---	--

Unedited	Lexile Range	1210L - 1400L		
Planning and Carrying Out Investigations	3	4	5	6
Planning and carrying out investigations that provide evidence to support explanations,	Provides a set of procedures that is aligned to the objectives of the inquiry/ design criteria and is likely to produce some evidence/data relevant to the purpose. Lists tools/instruments	Provides a set of procedures that is aligned to the objectives of the inquiry/ design criteria and is likely to produce some evidence/data relevant to the purpose. Lists tools/instruments	Provides an orderly, mostly replicable set of procedures that is likely to produce evidence that is aligned with the objectives of the inquiry/design criteria. Describes tools/instruments	Provides a clear and orderly, replicable set of procedures that will produce relevant and sufficient evidence aligned to the

design solutions, and/or models.	and types of observations/measurements to be gathered. Includes controls when relevant.	and types of observations/measurements to be gathered. Considers the amount of data needed to answer the inquiry question/evaluate the design and includes controls when relevant.	and types of observations/measurements to be gathered. Considers the amount of measurements/data needed to answer the inquiry question or evaluate the design with accuracy and includes controls when relevant.	objectives of the inquiry/design criteria and/or to test a model. Describes tools/instruments and types/amount of measurement s/data to be gathered needed to produce reliable measurement s and describes controls when relevant.
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Edited	Lexile Range	610L - 800L		
Planning and Carrying Out Investigations	3	4	5	6
Planning and carrying out investigations that provide evidence to support explanations, design solutions, and/or models.	Makes a basic list of materials, might lack some items. Procedure is lacking steps or clear sentences. However, tried to write the steps.	The materials list is completed and organized. Procedures need some revisions or organization. Think about the amount of data need to answer the question. Some science vocabulary included.	The materials list is completed and organized. The procedure is clear and organized. It's easy to follow and is clearly thinking about the testable question. Vocabulary terms are used mostly correct.	The materials list is completed and organized. Includes accurate amounts and quantities. The procedure is accurate and organized. Sentences are clear and easy to read It's easy to follow and is clearly thinking about the testable question.

				Vocabulary terms are used correct.
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Unedited	Lexile Range	1210L - 1400L		
Identifying Patterns and Relationships	3	4	5	6
Analyzing information to identify patterns and/or relationships relevant to understanding a phenomenon or to solve a design problem.	Identifies and explains patterns in the data or makes qualitative observations using logical reasoning. Patterns are relevant to understanding a phenomenon or solving a design problem. RELEVANT	Analyzes patterns and relationships among variables/data with minor errors or omissions, applying logical reasoning. RELEVANT FOR NGSS: Applies a basic statistics/probability	Analyzes patterns and relationships among variables/data accurately, applying logical reasoning. RELEVANT FOR NGSS: Applies a basic statistics/probability concept (e.g., mean, median, mode, and variability) or a mathematical concept (e.g., ratio, rate, percent, basic operations, and	Analyzes and explains observed patterns and relationships among variables/data with general accuracy, applying logical reasoning and relevant quantitative reasoning when appropriate. RELEVANT FOR NGSS: Applies relevant statistics/probability concepts or mathematical,

	FOR NGSS: Applies mathematics and/or computation. When relevant, compares similarities and differences in data collected by different groups in the class.	concept (e.g., mean, median, mode, and variability) or a mathematical concept (e.g., ratio, rate, percent, basic operations, and simple algebra). When relevant, compares similarities and differences in findings across different	simple algebra). When relevant, compares similarities and differences in findings across different trials and/or groups.	computational, and/or algorithmic representations. When relevant, identifies similarities and differences in different types and/or sources of data in terms of the consistency of measurements or observations.
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		trials and/or groups.		
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Edited	Lexile Range	810L - 1000L		
Identifying Patterns and Relationships	3	4	5	6
Analyzing information to identify patterns and/or relationships relevant to understanding a phenomenon or to solve a design problem.	Uses qualitative data to identify and explain patterns. This is organized in a table. steps.	Uses both qualitative and quantitative data to identify patterns among the variables. The information is only organized in tables. Simple math is applied to the table.	Uses both qualitative and quantitative data to identify patterns among the variables. There are graphs and tables which organize the data. There are clear applied mathematical concepts applied.	Uses both qualitative and quantitative data to identify patterns among the variables. There are graphs and tables which organize the data. They are clear and the best selected methods to share with the reader. They have all the chart elements applied and strong mathematical concepts have been applied.

Unedited	Lexile Range	1010L - 1200L		
Interpreting Data/Information to Make Valid Claims	3	4	5	6
Interpreting data/information from sources and making valid, credible claims about a phenomenon, model, or design solution.	Interpretation of data/information supports accurate claims about a phenomenon or design solution.	Interpretation of data/information supports accurate claims about a phenomenon or design solution. Discusses some limitations of the findings.	Interpretation of data/information supports accurate claims about a phenomenon or design solution. Discusses possible errors and limitations of findings. When possible, follows through on a plan to improve the accuracy of results (e.g., by increasing the	Interpretation of data/information supports accurate claims about a phenomenon, model, or design solution. Discusses possible sources of errors and limitations of findings. When possible, follows through on a plan to improve the accuracy of

			number of trials).	results (e.g., by increasing the number of trials).
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Edited	Lexile Range	610L - 800L		
Interpreting Data/Information to Make Valid Claims	3	4	5	6
Interpreting data/information from sources and making valid, credible claims about a phenomenon, model, or design solution.	Interpretation of data/information is accurate and relates to the project.	Interpretation of data/information is accurate and relates to the project. Mentions the limitations of the research.	Interpretation of data/information is accurate and relates to the project. Mentions the limitations of the research. If appropriate, makes a plan to improve the accuracy of the results.	Interpretation of data/information is accurate and relates to the project. Mentions the limitations of the research. If appropriate, plans to improve the accuracy of the results. Discusses any errors or outliers from the data. It is clearly written and talks about every data point.

Unedited	Lexile Range	1010L - 1200L		
Making Connections and Inferences	3	4	5	6
Connecting ideas and making inferences based on evidence or reasoning.	Makes relevant inferences based on evidence. Makes clear connections between two or more specific examples relevant to the inferences.	Makes relevant inferences based on evidence and identifies the larger significance of the inference. Connections between a specific example and the	Makes clear and relevant inferences based on evidence and partially explains the larger significance of the inference. Connections to the larger idea are made through multiple examples but may have some gaps in explanation or may not be fully developed.	Makes clear, relevant, thoughtful inferences and explains their larger significance. When relevant, identifies limitations of inferences based on gaps in evidence. Connections to the larger idea are clearly made through multiple examples.

		larger idea are clear and appropriate.		
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Edited	Lexile Range	610L - 800L		
Making Connections and Inferences	3	4	5	6
Connecting ideas and making inferences based on evidence or reasoning.	Making relevant explanations based on evidence from your data. Make a clear connection between 2 or more	Making relevant explanations based on evidence from your data. One claim needs to be significant and clear. Restate your hypothesis.	Restate the hypothesis and state whether you support or do not support your hypothesis. Then, present evidence to back that statement.	Restate the hypothesis and state whether you support or do not support your hypothesis. Then, present evidence to back that statement. Provides the next steps missing from the data collection process. What do we need to build on in our research?

	examples from the data.			
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Unedited	Lexile Range	1210L - 1400L		
Explanation of Evidence	3	4	5	6
Analyzing how the selected evidence support the writer's statements (e.g., claims, controlling ideas).	Explains relevant facts, definitions, concrete details, and/or quotations and examples (and illustrations or multimedia, when appropriate) that support the opinion/main idea.	Provides relevant analysis that explains how the selected evidence supports claims or statements. Analysis stays rooted in the evidence but at times may be vague, illogical, or overly general.	Provides clear analysis that accurately explains how the selected evidence supports claims or statements.	Provides insightful and clear analysis that thoroughly and accurately explains how the evidence supports claims or statements. When relevant, analysis acknowledges some weakness(es) or gaps in the evidence.

Edited	Lexile Range	1010L - 1200L		
Explanation of Evidence	3	4	5	6
Evidence Analyzing how the selected evidence supports the writer's statements (e.g., claims, controlling ideas).	Explains facts, definitions, and solid details from the data.	Provides a clear analysis that explains how the selected evidence supports your hypothesis. Analysis relates to the evidence but at times may be too general.	Provides clear analysis that accurately explains how the selected evidence supports your hypothesis.	Provides a clear analysis that accurately explains the whole hypothesis and predictions. You might mention weaknesses or gaps in the evidence.

APPENDIX E

IBA SCORE AND REPORTING

Experimental Small Sample

FirstName	Group	Submit Date Time	Assessment Name	Grade Level When Assessed	Reporting Category	Scale Score	Error Band Min	Error Band Max
SIMON	Experimental	Oct 16, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	At/Near Standard	2566	2517.812	2614.188
SIMON	Experimental	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	At/Near Standard	2560	2511.4508	2608.5492
LILYONNA	Experimental	Oct 16, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	Below Standard	2485	2424.6934	2545.3066
LILYONNA	Experimental	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	Below Standard	2494	2435.6885	2552.3115

CHRISTOPHER	Experimental	Oct 16, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	At/Near Standard	2552	2502.7492	2601.2508
CHRISTOPHER	Experimental	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G9	At/Near Standard	2528	2475.9598	2580.0402

Comparison Small Sample

First Name	Group	Submit Date Time	Assessment Name	Grade Level When Assessed	Reporting Category	Scale Score	Error Band Min	Error Band Max
KIARA	Comparison	Oct 16, 2020	High School ELA - Research: Analyze and Integrate	G10	Below Standard	2485	2424.6934	2545.3066

			Information (FIAB)					
KIARA	Comparison	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G10	Above Standard	2683	2626.3199	2739.6801
GAGE	Comparison	Oct 16, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G10	Below Standard	2371	2263.489	2478.511
GAGE	Comparison	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G12	At/Near Standard	2526	2473.7225	2578.2775
Robert	Comparison	Nov 6, 2020	High School ELA - Research: Analyze and Integrate Information (FIAB)	G10	At/Near Standard	2642	2591.7334	2692.2666
Robert	Comparison	Nov 6, 2020	High School ELA - Research: Analyze	G10	At/Near Standard	2310	2095.5	2524.5

			and Integrate Informatio n (FIAB)					
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APPENDIX F

STUDENT INTERVIEW QUESTION

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

1. Describe your experience with Summit Learning. Do you enjoy learning with Summit?
2. Did you find yourself self-reflecting on the project more, once the rubrics were put into student friendly language.
3. Are you good at science?
4. Do you learn science best when you use hands-on activities, such as labs or models?
5. Would you rather memorize notes and take tests or have the chance to do real science?
6. Do you know how the grades work in Summit? Could you explain it to a new student?
7. What do you like about science?
8. Was using the cognitive rubrics helpful on completing the projects?

APPENDIX G

COGNITIVE RUBRIC BREAKDOWN

Experimental Group Selected Data											
Student First	Course Name	Absences	Asking Questions	Predicting/Hypothesizing	Planning and Carrying Out Investigations	Identifying Patterns and Relationships	Comparing/Contrasting	Interpreting Data/Information to Make Valid Claims	Making Connections and Inferences	Explanation of Evidence	Introduction and Conclusion
Christopher	Experimental Group	2	6.0	4.0	6.0	6.0	5.0	6.0	6.5	5.0	5.0
Simon	Experimental Group	0	6.0	3.0	6.0	6.0	4.0	3.0	5.0	6.0	6.0
Lilyonna	Experimental Group	0	6.0	6.0	1.0	6.0	5.5	5.0	5.5	6.0	6.0
	Average	0.6666666666666667	6.0	4.3	4.3	6.0	4.8	4.7	5.7	5.7	5.7

Comparison Group Selected Data											
Student First	Course Name	Absences	Asking Questions	Predicting/Hypothesizing	Planning and Carrying Out Investigations	Identifying Patterns and Relationships	Comparing/Contrasting	Interpreting Data/Information to Make Valid Claims	Making Connections and Inferences	Explanation of Evidence	Introduction and Conclusion
Robert	Comparison Group	2	4.0	4.0	4.0	3.0	4.0	3.0	4.5	4.0	3.0
Gage	Comparison Group	3	6.0	4.0	5.0	5.0	5.0	5.0	4.0	4.0	4.0
Kiera	Comparison Group	10	5.0	6.0	6.0	6.0	0.0	6.0	5.5	6.0	6.5
	Average	5	5.6	4.5	4.6	5.4	4.0	4.7	5.2	5.2	5.2

APPENDIX H

SBA

Assessment Type	Assessment Name	Subject	Item #	Claim	Target	Item Difficulty	Standard	Full Credit	0	1
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	3	Research and Inquiry	2	Difficult	11-12.RH.3	17%	83%	17%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	4	Research and Inquiry	2	Moderate	11-12.WHST.8	17%	83%	17%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	7	Research and Inquiry	2	Moderate	11-12.RST.1	17%	83%	17%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	10	Research and Inquiry	2	Moderate	11-12.RST.1	17%	83%	17%
IAB	High School ELA - Research:	ELA	2	Research and Inquiry	2	Moderate	11-12.RST.1	33%	67%	33%

	Analyze and Integrate Information (FIAB)									
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	8	Research and Inquiry	2	Moderate	11-12.RST.1	33%	67%	33%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	5	Research and Inquiry	2	Moderate	11-12.WHST.8	50%	50%	50%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	6	Research and Inquiry	2	Moderate	11-12.WHST.8	50%	50%	50%
IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	1	Research and Inquiry	2	Moderate		67%	33%	67%

IAB	High School ELA - Research: Analyze and Integrate Information (FIAB)	ELA	9	Research and Inquiry	2	Moderate	11-12.RH.3	67%	33%	67%
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APPENDIX I

EXPERIMENTAL TRANSCRIBED INTERVIEW

Experimental Group

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

1. Describe your experience with Summit Learning. Do you enjoy learning with Summit?

Simon: It's very easy to use and it's kind of simple. They layout is simple and easy to find everything.

Alex: Yeah, it's easy to navigate.

2. Did you find yourself self-reflecting on the project more, once the rubrics were put into student friendly language?

Simon: I don't think I ever did this.

Jakiah: I was never good at this.

3. Are you good at science?

Chris: No, I don't really enjoy the subject.

Jakiah: Not particularly good at it. The way they lay it out it's difficult for me to answer.

Lilyonna: Yes, I am pretty decent at it.

Simon: It depends on the science I am doing.

4. Do you learn science best when you use hands-on activities, such as labs or

models?

Simon: It's an easy one to answer. I prefer hands-on.

Alex: Hands-on than shown.

Jakiah: A bit of both.

Lilyonna: A bit of both.

Chris: Hands on only.

5. Would you rather memorize notes and take tests or have the chance to do real science?

Lilyonna: Real science.

Simon: Real science.

Alex: Real science.

Chris: Real science.

Jakiah: Real science.

6. Do you know how the grades work in Summit? Could you explain it to a new student?

Simon: No. I don't know where to see them. It's weird.

Lilyonna: Yes. I understand it now. I can show another person.

Jakiah: I didn't know we were given grades.

7. What do you like about science?

Simon: Anything that eats metals.

Alex: All the experiments.

Lilyonna: Astronomy.

Jakiah: Mixing chemicals and stuff.

8. Was using the cognitive rubrics helpful on completing the projects?

Lilyonna: Yes. That helped very much.

Simon: I never looked at the conative rubrics.

Chis: I used the conative rubrics.

Jakiah: I don't remember looking at them.

Alex: Same here!

APPENDIX J

COMPARISON TRANSCRIBED INTERVIEW

Comparison Group

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

1. Describe your experience with Summit Learning. Do you enjoy learning with Summit?

Julia: My experience has not been good, and I don't enjoy using it.

Savanna: I have never used it.

Kiara: I enjoy using it. It's easy to find things.

Tori: I am new to it.

Josh: I think Summit is just fine. I have not had a bad experience.

2. Did you find yourself self-reflecting on the project more, once the rubrics were put into student friendly language?

Kiara: Say that again. No. I never have. Normally, I just read the number I tried to get. I just never wrote it down.

Josh: I do use that to find out what grade I might get.

3. Are you good at science?

Savanna: No.

Uri: I am so bad at it.

Jasmine: I hate it!

Kiara: I like science. I only like it when I understand it. I sometime look forward to doing it.

4. Do you learn science best when you use hands-on activities, such as labs or models?

Savanna: I can do both.

Uri: I can do both no problem.

Kiara: Both. I am used to be given a worksheet and doing it together as a class. You fill it in and then practice doing by myself.

Julia: Both.

5. Would you rather memorize notes and take tests or have the chance to do real science?

Savanna: Real science. Nobody wants to take tests.

Kiara: Take notes and do a test.

Jasmine: I do!!!

Uri: Both is honestly fine.

Kiara: I don't like doing too much work.

Jasmine: I know he can't make us do that much work from our home.

6. Do you know how the grades work in Summit? Could you explain it to a new student?

Jasmine: All I understand is green.

Kiara: Heck no.

Uri: No.

7. What do you like about science?

Kiara: Nothing specific. I just like learning new things.

Uri: Anatomy.

Savanna: I don't like anything about that.

Uri: Anything that catches my eye.

8. Was using the cognitive rubrics helpful on completing the projects?

Josh: I find them very helpful.

Kiara: Same.

Jasmine: Yeah.

Julia: No. What are those?

APPENDIX K

TEACHER POLLING DATA AND RESPONSE

Date	This week, what was my average level of motivation to teach?	This week, what was my average confidence level?	Did students have the chance to self-reflect by using the modified cognitive rubric?	How?	How did the changes to the cognitive rubrics inform my teaching this week?	Is the treatment introduced making an impact on student learning?	Any new ideas or suggestions for improvement?
10/9/20	3	2	Yes	I created the first 3. I decided to use Lexile to measure the changes between the modified rubrics.	I feel confident with using a measurable number to track the difference between Summit's and my own cognitive rubrics.	3	No.
10/16/20	4	3	Yes	I put the edited rubrics into Google Classroom.	I see the students verify that they understand my expectations by verbalizing it.	4	I need to edit the project to meet my timeline. I am crunching for time.
10/23/20	3	3	No	They were waiting for the plants to grow and so they had in-class work days on PFA.	I am editing the next round of rubrics and they are helping modify my lessons to meet specific targets.	4	No.
10/30/20	4	5	Yes	I shared the results with the	My materials feel more	5	I think next time I teach

				students and put the cognitive rubric in my slide presentation.	aligned with the rubrics. I can't help but also notice changes in my comparison group as well. I think that this has really improved my focus for my lesson. I feel confident.		this I need to give myself more time to finish this project.
11/6/20	5	5	Yes	The students have been turning in the final portions of the project. They have access to the modified rubrics and they have been following the steps outlined to make sure their project meets the requirements.	Being the final week, I felt rushed. However, the rubrics reminded me to focus and only stick to the things that are important.	5	I want to continue this practice in my other classes.

Appendix L

PROCEDURE FOR INSTRUMENT 1

Steps	Description
Review and edit the cognitive rubrics to be student friendly.	The comparative group will spend time editing the 8 cognitive rubrics to be “student friendly” before starting the checkpoints. Each group will spend the first day reviewing the cognitive rubrics.
Checkpoint 1: Lab Report Introduction	Write the 1st section of your Lab Report! Scientists write introductions to provide readers with background information and context about your experiment. In your written introduction, include background information about Bioremediation and key pieces about your experimental design.
Checkpoint 2: Materials and Procedures	During this Checkpoint, students follow their designed Bioremediation experimental procedures to plant their Fast Plants and add toxins to them (Copper or Zinc). Then, students write about the processes they followed and the materials used in the Materials and Procedure section of their Lab Reports for Checkpoint 2.
Checkpoint 3: Write Lab Results	During this Checkpoint, students use data from their Bioremediation experiments to create graphs. Once graphs are created, students use them to identify patterns, trends, and relationships to draw conclusions about outcomes and accuracy of their experiments. Students include their graphs and any annotations that

	identify patterns and relationship in the Results section of their Lab Reports.
Checkpoint 4: Write Lab Report Conclusion	Write the last section of your Lab Report! Provide the reader with an understanding of your conclusions made from your Bioremediation experiment in a Claim, Evidence, Analysis format. Also, provide your recommendations to Apple & Google about what they should do about their E-Waste problem.
Checkpoint 5: Finalize Lab Report	Review, revise, and finalize your Lab Report so you have a final draft ready to turn in!
Grade Lab Reports using the 8 cognitive rubrics.	Asking Questions Students generate a main research question and use it to create a hypothesis. Students write about their research question in the Introduction section of their Final Lab Report. Predicting/ Hypothesizing Students generate a hypothesis that they can test using their designed Bioremediation experiments and data collection. Students include their hypothesis in the Introduction and Conclusion sections of their Final Lab Report. Planning and Carrying Out Investigations

	Students write a Materials and Procedure section for their Final Lab Report that covers the procedures, materials, and methods used to test their hypothesis. Identifying Patterns and Relationships After collecting data, students analyze their Fast Plant data by first constructing graphs then identifying patterns and relationship they observe in their graphs. Students include their graphs in the Results section of their Final Lab Report. Interpreting Data/Information to Make Valid Claims Students write a summary interpreting their graphs and data for the Results section of their Final Lab Report. Making Connections and Inferences During the Conclusion section of their Final Lab Report, students make connections to how their Bioremediation experiments and overall findings can be used as a possible solution for the E-Waste problem. Students make connections back to the Ethics of E-Waste project. Explanation of Evidence
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	During the Conclusion section of their Final Lab Report, students state whether their hypothesis was supported or not then explain the evidence that supports their claim. Students draw upon the evidence they included in the Results section of their Final Lab Reports (graph and interpretation summary). Introduction and Conclusion Students write an Introduction and Conclusion section for their Final Lab Reports that covers background information about Bioremediation and concluding statements about the findings of their Bioremediation experiments.
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APPENDIX M

STUDENT POLLING SURVEY

<https://forms.gle/YkuZmnfmcDQucHVj6>

9/30/2020

Summit Polling Information

Summit Polling Information

Students will go through each polling question/statement and provide an accurate response. Take time to reflect on each response and be honest with yourself. Participation in this research is voluntary and participation or non-participation will not affect a student's grade or class standing in any way.

1. Learning from Summit has been a positive experience.

Mark only one oval.

☐ Disagree

☐ Agree

2. Explain your answer to the question above.

3. In the future, I will learn and enjoy using Summit for my classes.

Mark only one oval.

☐ Strongly disagree

☐ Disagree

☐ Neutral

☐ Agree

☐ Strongly agree

9/20/2020

Summit Polling Information

4. Summit Learning Platform has improved my learning in Science (Biology).

Mark only one oval.

- ☐ Strongly disagree
- ☐ Disagree
- ☐ Neutral
- ☐ Agree
- ☐ Strongly agree

5. I enjoy science.

Mark only one oval.

- ☐ Disagree
- ☐ Agree

6. I understand how cognitive rubrics are used to determine my grade for final products?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Maybe

7. Describe how the cognitive rubrics have helped you with a final project.

9/20/2020

Summit Polling Information

8. I know how to access my projects and submit feedback.

Mark only one oval.

☐ Disagree

☐ Agree

9. I review, fix, and resubmit my feedback on projects.

Mark only one oval.

☐ Agree

☐ Disagree

10. I have used the cognitive rubrics when self assessing my own work.

Mark only one oval.

☐ Agree

☐ Disagree

11. I am worried about.

Check all that apply.

☐ My grade in Summit.

☐ That I will not finish on time. I will miss deadlines

☐ I don't understand the material.

☐ Nothing.

☐ The collaborative team work involved with summit.

Other: ☐ _____

9/20/2020

Summit Polling Information

12. I am happy.

Check all that apply.

- ☐ Summit is a new platform that is easy to use.
- ☐ We get more face-to-face instruction.
- ☐ That we are accountable for our own learning.
- ☐ Nothing.
- ☐ TSHS has options for our learning.

Other: ☐ _____

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APPENDIX N

TEACHER WEEKLY SURVEY

<https://forms.gle/maNV7AALLv6S9fjE9>

9/30/2020

Weekly Teacher Polling Information

Weekly Teacher Polling Information

Participation in this research is voluntary and participation or non-participation will not affect a student's grade or class standing in any way. This poll will be taken every week for the teacher to reflect on the additions made, for the duration of the study.

1. Date

Example: January 7, 2019

2. This week, what was my average level of motivation to teach?

Mark only one oval.

- ☐ Extremely Low
- ☐ Low
- ☐ Neutral
- ☐ High
- ☐ Extremely High

3. This week, what was my average confidence level?

Mark only one oval.

- ☐ Extremely Low
- ☐ Low
- ☐ Neutral
- ☐ High
- ☐ Extremely High

9/30/2020

Weekly Teacher Polling Information

4. Did students have the chance to self-reflect by using the modified cognitive rubric?

Mark only one oval.

- ☐ Yes
☐ No
☐ Maybe

5. How?

6. How did the changes to the cognitive rubrics inform my teaching this week?

7. Is the treatment introduced making an impact on student learning?

Mark only one oval.

- ☐ Poor
☐ Below Adverage
☐ Adverage
☐ Above Adverage
☐ High

9/30/2020

Weekly Teacher Polling Information

8. Any new ideas or suggestions for improvement?

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APPENDIX O

KWL FIELD NOTES

Weeks	K: What Do I Know?	W: What Do I Want To Know?	L: What Did I Learn?
Oct 5 th to Oct 9 th	I know that my 1 st period class has completed more work and seems to be more engaged, which is positive.	I want to see how they use the student language on the first cognitive rubrics. We have a short week, so I am going to introduce the first one.	I learned that editing the cognitive rubrics takes a lot of time. I also figured that I can measure my rubrics using the Lexile numbers.
Oct 12 th to Oct 16 th	I made new edited cognitive rubrics. Checkpoint 1 is going to take the students a lot of time to finish because it's a lot of writing. I need to explain and start the project on my end.	Can the students understand my rubric? Is it within their reading ability?	I referenced the first three cognitive rubrics 4 times and found that the students could understand. I put an outline in the student notebooks to help scaffold for checkpoint 1.
Oct 19 th to Oct 23 rd	My pacing is off. I need to adjust the checkpoints if I want to finish on time. The adjustments will be informed by the rubric's edits.	Will I finish this project on time and collect enough data from the students? Do the students feel rushed?	I have to make modifications and access changes. I think that the data needs to be delivered to the students at the end of next week. This will give enough time to make graphs.
Oct 26 th to Oct 30 th	Chronic absence has been my biggest struggle so far. We as a school have been building in supports and interventions to combat this issue.	How will low attendance affect final project grades?	I am learning that I refer to the cognitive rubrics often- I have it constantly pulled up on the screen. I see the students applying the changes made to the rubric. Attendance slightly improved. However, there has been missing students.
Nov 2 nd to Nov 6 th	This is the last week and I still need time to apply the survey and give the IBA. Students need to work on putting their final project together and turning in their work.	Have students gained understanding on the grading by the changes I've made to the cognitive rubrics?	So far, I have seen many students push to finish. A few students need an extension to turn in their project, which I am willing to do.

APPENDIX P

FINAL SCORES AND CLASS AVERAGE

Experimental Group Data

Student First	Past Projects	Cog Skill Averages	Cog Skill Percent	Overall Score	Absences
Christopher	2	5.5	100%	100	2
Simon	2	5.0	93%	94	0
Lilyonna	2	5.22	96%	97	0
	Averages	5.24	96%	97	0.666666666666667

Comparison Group Data

Student First	Past Projects	Cog Skill Averages	Cog Skill Percent	Overall Score	Absences
Kiara	1	5.2	18%	34	1
Robert	1	3.7	81%	85	7
Gage	1	4.7	55%	57	1
	Averages	2.25	51%	58.6666666666667	3

