EFFECTS OF TERM LENGTH ON ACADEMIC SUCCESS IN A SCIENCE CLASSROOM

by

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ABSTRACT

The purpose of this action research was to determine if term length had an association with student success in an alternative high school. Alternative high schools traditionally have smaller class sizes and a diverse population of students. The procedure was to examine if a shorter term (octer four week grading period v quarter nine week grading period) had an effect on students' academic success with passing rates in a science classroom. The procedure included examination of not only passing rates, but also student self-efficacy using a Likert scale and student interviews within the science classroom. Evaluation of the same procedure was examined with other core subjects of language arts, math and social studies. This was done to determine if term length also had an effect on all core subject areas and could result in an overall effect on academic success.

INTRODUCTION AND BACKGROUND

Introduction

This action research (AR) was conducted to determine if a switch to a different schedule type will improve academic performance within a science classroom at an alternative high school. The schedule switch entailed a switch to a shorter length of time (nine weeks to four weeks). Also implemented was a move to a four week grading period and increased frequency of learning days (two per week to four per week). The study was conducted to help determine a significant problem within the science classroom, along with other core subject teachers at Red Canyon High School (RCHS) having identified issues with students' lack of retention of material, self-confidence, and engagement that seem to decrease over the longevity of a quarter (nine week) grading period. Historical attendance data from RCHS has shown that attendance drops significantly at week six within the quarter scheduling format. Prior to this study, a new type of grading schedule has been discussed for some time at RCHS to see if increased frequency, along with a shorter length of time, could increase student passing rates and overall increase credits which will improve attainment of graduation. The octer, a four-week grading period is the shorter grading period that was introduced to understand if a shorter schedule is beneficial for student success.

Background

I have been teaching at RCHS for six years. At RCHS I teach 9-12 grade students Colorado State Standards in mixed ability classes, depending on scheduling, class offering, and student academic needs. RCHS is located in Eagle County, Colorado and a public school within Eagle County School District RE-2. RCHS is a dual campus school located in Edwards and

Gypsum. Each school is roughly split with an even population of students roughly around 100 students at each campus. A typical class is smaller than a traditional school and typically has 12 or less students and aligns with RCHS handbook of having a maximum teacher to student ratio of 1:16.

RCHS is the alternative public educational option for students within Eagle County. It is also important to define what alternative education is and why an octer might be an important scheduling switch for our population of students. The Colorado Department of Education defines alternative campuses as, "schools with specialized missions designed to serve high-risk student population" (Colorado Department of Education, 2019, para 1).

The demographics of RCHS include students who are behind on credits, in need of counselors and therapy, non-traditional students, gaps in education and others with additional needs and supports. Ethnically RCHS serve over 75% Hispanic population, a low socioeconomic demographic, along with free or reduced lunch program. However, this information is assumed since the school district does not release socioeconomic data on students.

Grades are defined as an increase or decrease from the current schedule using a grading system of A (90-100%), B (80-89.9%) or not yet (0-79.9%). To pass a class at RCHS a student needs to achieve a grade of an A or a B. Any grade below an A or B is considered a No Credit (N/C). If a student receives a no credit, they do not earn credit or partial credit for the class and they have to retake the class for credit. Grades at RCHS are split between academic and character grades. Academic grades are worth 80% of a student's grade and character grades are worth 20% of a student's final grade. Character grades were analyzed using RCHS character rubric (Appendix A). Character grades are assessed by teacher discretion. However, in order to receive three out of three, students must be meeting all criteria within the character rubric. It is in the best interest of the student to demonstrate good character as their character score accounts

for 20% of their overall grade. Historically, data analysis at RCHS has determined that an overall student character score under a 2.5 makes it difficult to pass a class.

The development of my primary question and three sub questions were engineered through a combination of AR exploration through my Master of Science in Science Education program (MSSE) at Montana State University and through a group of teachers at RCHS that have talked about the idea of an octer scheduling model to facilitate a different grading period schedule to help alternative students earn credits, and in turn increase student motivation and engagement within their classes and school. The idea of a modified grading schedule came from information observed at the Colorado Alternative High School Conference. Literature reviews and assignments through the MSSE classes 504 and 505 helped me determine my AR questions. Ideas arose from examination of low passing historical rates at RCHS. The last academic year 2019-2020 the passing rate at RCHS was 50.13 percent.

From ideas about short term scheduling, RCHS staff interviews were conducted in February 2020 indicating why octers might be beneficial for at-risk and alternative learners. One teacher described their thoughts on octers as

> Being beneficial, based off the people I have talked to, who have octers implemented within their schools, have found that student achievement has been increased because of the shorter period of time and the intensity of the curriculum that forces students to focus on learning and not to forget what they have learned" (Teacher 1).

Another example was that

> Students struggle to keep it together for the eight to nine-week quarter system we are currently on. They have a life, job and family change. If this change to octers could help them see success and can create positive momentum and they can keep that momentum to the next octer, I am in favor of octers (Teacher 2).

During my AR my support team was composed of a group of administrators, counselors, and teachers who are dedicated in supporting student learning, achievement, completion of their

high school career and support for after high school in terms of career or college readiness at RCHS (Appendix B).

Focus Context and Question

My focus question was, What is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer).

My sub questions include the following:

1. What impact will a schedule change have on student motivation within a science classroom?
2. How does student self-efficacy change with a schedule change?
3. How can the information from this study benefit me as a teacher and RCHS as a community?

CONCEPTUAL FRAMEWORK

Literature Review

Research has been conducted on the effectiveness on academic success on term length within higher education and traditional high schools, but limited information can be found on term length and academic success within the alternative setting. Alternative students face a higher risk of dropping out, and knowing who those students might be and understanding how educators bring these types of students into engagement and back to school can lead to greater success rates. Findings indicate that "there is no single simple cause underlying the problem of discouraged learners" (De La Rosa, 1998, p. 269). However, a majority of students identified to be a dropout or suited for alternative education fall into one or more of these categories: "low socio-economic class, minority status, low test scores, grades and are dissatisfied with school" (De La Rosa, 1998, p. 269). Students choose alternative education because "most students recognize the values of education and want to earn their high school diploma" (p. 271) offering of "flexibility and choice as key elements" (p.271), along with these factors "alternative programs have consistently found caring teachers are a vital component to any successful program along with alternative programs experience is their small size" (pp. 271-272). Information from Jere Brophy indicates that "compensatory education of low-achieving students from low socio-economic status backgrounds" success can be linked to teacher behavior and student achievement gains (Brophy, 1988, p. 235). Information from Alexander W. Astin (1999) on student development theory reveals what student involvement can look like in school and how the faculty and student interaction can have an impact on student involvement. Astin defines involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (p. 518). Understanding involvement with how the teacher student

interaction is taking place within a science classroom can also be influenced by student's self-efficacy. Astin refers to "student involvement as the quantity and quality of physical and psychological energy that students invest" (p. 528). Scheduling change could provide a change in quantity and quantity by providing as Astin refers to as "locus of control"(p. 528). Perceptions can be changed with the time allocation of scheduling types. Brown and Saks (1986) examined time as an allocation of student success with test scores. "In a typical classroom students come from diverse educational and cultural backgrounds and may learn a subject matter at different rates" (p. 480). Brown and Saks examine the "beginning achievement level in a grade effects the rate of learning as function of time" (p. 481). Achievement variation change with regards to the "productivity of time may vary with the degree of task engagement, the difficulty or pacing of the subject matter, and any number of other attenuating factors" (Brown & Saks, 1986, p. 482). Brown and Saks find that time has positive effects on grades and instruction strategies. Understanding how different schedule types as a function of time help to understand how academic achievement gains compare.

By definition, self-efficacy is "a personal belief that one can perform a task or cope with a situation. Self-efficacy determines what tasks or activities a person will attempt and how long they will persist at the task" (Rastall, 1996, p. 3). Understanding students' self-confidence and engagement within a science classroom along with what instructional tools work for student achievement was explored within this action research to see if these sub questions have an effect with term length and overall academic achievement. Self-confidence was defined as "person's perceived capability to accomplish a certain level of performance, or belief one has in being able to execute a specific task successfully (e.g., solving a math problem) in order to obtain a certain outcome" (Druckman & Bjork, 1994, p. 174). Academic engagement was defined as, "a multidimensional construct that is gaining increasing attention in education as a means of

promoting positive academic and social behavior outcomes for diverse learners across all levels of education" (Al-Hendawi, 2012, p. 1).

Understanding different types of self-efficacy demographics along with student involvement within school and teacher behavior was used to link higher academic outcomes in alternative students as an indicator of time spent with alternative students. An issue of quality v. quantity in low-achieving students provides indication that meeting with students four days a week for roughly five weeks, versus the amount of information that can be covered in a quarter or semester academic schedule can provide greater academic success. This can prove beneficial for what an alternative setting provides student in terms of academic understanding, gaining mastery, student-teacher relationships, and greater involvement within the science classroom.

Understanding the effect of student achievement between scheduling types has been limited, in terms of understanding within an alternative high school setting. Bostwick et al. (2018) examined the switch between quarters (10 weeks) to semesters (15 weeks) at the college level in Ohio four year public universities. This longevity study spanning 1991 through 2010 revealed that "switching from quarters to semesters leads to significantly worse academic outcomes" (Bostwick et al., 2018, p. 5). Several factors are related to the decrease in earning credits and graduating on time by using a semester grading schedule. A further decrease in grading term for an alternative high school could be beneficial for students who are already suffering from issues such as, reduction in on track graduation from reduced earned credits, socioemotional issues, non-traditional learners, substance abuse, trauma, low-socioeconomic, LGBTQ, and a majority English language learners. The impact of longer grading periods has found to have an impact of university academic calendars, finding that

> Potential effects of calendar changes have been explored in more depth at the elementary and secondary school levels. These studies tend to find that longer school years (or weeks) are associated with worse student outcomes. Consistent

> with this other literature Bostwick found that four-year graduation rates suffer when universities change from 10 to 15 week terms (Bostwick et al., 2018, p. 4).

The adoption of a quarter schedule allows "several benefits to occur in this schedule for both the advanced student and the student who needs additional academic support" (Merenbloom et al., 2013, p. 108). Quarters offer course placement that can accommodate the student who needs extra support along with "shorter terms associated with quarters is that it is easier to recover from a poor academic performance in a given quarter course" (Bostwick et al., 2018, p. 17). For example, "a student who has had difficulty with the first half of a course can repeat that first half rather than moving into the next half of the course before mastery is attained" (Merenbloom et al., 2013, p. 109). Bostwick et al. (2018) found that within an average cohort of 1,237 students "switching to semesters reduces on-time graduation by 2.9 percentage-points, 36 students in the average sized will experience delayed graduation" (p. 16).

In a study performed by Gruber and Onwuegbuzie (2001), they examined the "effects of block scheduling on academic achievement among high school students" (p. 1). The study examined a high school in Georgia from two groups who graduated in the 1996-1997 school year and the 1999-2000 school year. In the 1996-1997 school year students took a traditional schedule consisting of a six period school day. In the 1996-1997 school year graduates had a sample size of n=146. The 1999-2000 school year students moved to a 4X4 block schedule. The 1999-2000 graduates had a sample size of n=115. Demographics of the school had roughly 501 students from grades 9-12, a graduation rate of 61 percent and 37 percent of the student body was eligible for free and reduced lunch.

The instruments of the study examined the Georgia High School State Graduation Test (GHSGT) scores along with student cumulative GPA between the traditional and block scheduling types. Results from a Mann-Whitney test "reviled no significant difference in GPA

between the two groups" (p. 37). A Mann- Whitney test and a Cohen test to analysis the GHSGT scores found the students performed better within the traditional schedule compared to the block schedule. Results from this study provide insight that block scheduling does not have a positive effect on academic achievement.

Along the many scheduling types offer different results when compared to traditional scheduling verse block scheduling or quarters v semesters, I have yet to find a study that examines scheduling types and academic achievement within an alternative school. I have also not found a peer reviewed information on a short schedule such as a octer, that has a blended model of a 4X4 block in terms of time with a modified term length like in a quarter schedule. Literature is mixed on the findings between what is the best scheduling type for student success, and more "schools are converting to the block scheduling to improve test scores, reduce discipline problems, and to enhance learning through longer learning class periods" (p. 33).

METHODOLOGY

Demographics

The studies treatment group examined 27 students at RCHS to understand if student GPA and self-efficacy increased in a science classroom with a shorter grading period. The study had a total of 17 male and 10 female students. The population examined had a total of eight students with accommodations; English language learners, special Education, 504, gifted, or Title 1.

The non-treatment group had a total for 33 students, consisting of 15 male and 18 female. Accommodation demographics for quarter historical data for the non-treatment group could not be obtained, due to the fact that a majority of students have graduated, moved, dropped out, etc. Demographics of RCHS and alternative students defined by De La Rosa (1998) help to provide a stability in the population the RCHS services.

Examination of three cross-core curriculum teachers and students (language arts, math and social studies) were also compared to determine in a change if a shorter grading period would be beneficial to initiate a schoolwide change. Teacher and student interviews were conducted to find themes from a quarter to an octer schedule. All three teachers and students examined have taught at RCHS with quarter scheduling.

Treatment

Treatment occurred at the beginning of the 2020-2021 school year. This academic year Red Canyon High School (RCHS) has moved to an octer schedule in the wake of COVID-19. Octer scheduling at RCHS has been adopted from a quarter schedule (nine weeks) to an octer schedule (four weeks) to provide in-building safety for staff and students while still being able to conduct in person classes.

Initial sampling was to be conducted with the idea of using a hexter v quarter scheduling. Instead of using the hexter schedule, an octer schedule was developed. The hexter is a six-week grading period and the octer is a four week to four week grading term. The octer was developed to maximize student course offerings and allow students to gain the most credits possible within the academic school year.

Sampling was conducted at the start of the 2020-2021 school year on 8/25/2020 and at the end of octer two on 10/18/2020. Sampling was conducted through two octers and was compared to previous taught quarter sessions. Since RCHS is a dual campus school, both campuses were sampled. Octer sampling included three in-person science class offerings that spans four and a half weeks of teaching four days per week (Monday, Tuesday and Thursday, Friday) for 90 minutes before switching campuses. Each octer included the same three science-based class offerings. Modifications due to COVID-19 did not allow for quarter classes to be examined. To determine the primary objective, quarter sampling was compared to historical passing rates and character data for the same class being examined through the octer format. During the quarter schedule, a typical class offering to students included eight classes offerings through A/B days. Teachers taught two separate class offerings to students each day. During the quarter, classes lasted 90 minutes and students saw their teacher two days per week on nonconsecutive days (Monday/Wednesday (A) and Tuesday/Thursday (B)).

Data Collection and Analysis Strategies

The primary question will be examined by using strategies by Austin and Gustafson (2006) and also Veal (2000) peer reviewed articles. Within the two studies, a relationship between students' grade point average (GPA) from taking different term lengths and their success by performance GPA was explored. Within both studies examination of GPA was used

to compare student success on different schedule types. Within this action research a histogram will be used to show passing rates and grade change from quarter to octer scheduling. Adaptation of passing rates compared to GPA will be used to show a positive or negative change of scheduling type will be used because RCHS uses a A (90%), B (80%) passing score to earn credit. Every score below 80 percent fails the course. Learning target grades, overall grades, and character score will be compared to determine if course length has an overall impact on student success. Learning target grades are state defined learning goals that each student needs to pass to achieve state and Eagle County School district curriculum. Character are RCHS norms. Overall grades are a combination of learning target grades and character grades. At RCHS learning target grades or academic grades are weighted at 80 percent and character grades at 20 percent of students' overall grade.

Examination of sub question one examined what impact will a schedule change have on student motivation within a science classroom. This was examined through a pre-and-post Likert scale questionnaire adopted from Pickens and Eick (2009, pp. 361-362; Appendix C), and validated though a qualitative student interview process (Appendix D).

Examination of sub question two examined how does student self-efficacy change with a schedule change? This was examined through a Likert scale questionnaire along with teacher interviews and character grades. Likert scale questionnaires and interviews were only taken form students who experienced quarter and octer formats at RCHS. Character grades examined teacher input of character from historical quarter data and octer inputs. The use of character grades was to determine if teacher's belief of students reaching RCHS norms improved form the quarter to octer scheduling types. Use of the Likert scale student pre-test and post-test on self-efficacy test developed by Jinks and Morgan (1999) helped determine students' motivational strategies with a focus on self-confidence and engagement changed over the term offerings.

Likert scale on student motivation and engagement within science content only will examined through Morgan and Jinks Student Efficacy Scale (MJSES; Appendix E, Appendix F). Sub question two examines self-efficacy to help determine self-confidence and engagement. Using a Likert scale (MJSES) examines three categories of examination of the categories: talent, context and effort (Appendix G). Use of this treatment was determined to be used to help to "attempt to understand more about how to motivate underachieving students. Student efficacy data might provide valuable clues about how individual students perceive their talents and about the outcome expectancies they associate with effort" (Jinks & Morgan, 1999, p. 227).

Data collection approaches used to examine effectiveness of a switch in the schedule types on passing rates, academic self-confidence and engagement used a triangulation mixed methods approach. Using this method allowed for the use of quantitative and qualitative data that are collected at about the same time and will be given equal emphasis to combine the strengths of each study from that data (Mertler, 2020, p. 108). Triangulation methods used within this action research project can be found in Table 1.

Table 1. Triangulation method for action research project.

Research Questions	Data Source		
	1	2	3
Primary: What is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer)?	Quantitative data Analysis from learning targets assessed in the term.	Quantitative data Analysis on final grades from quarter to octer	Qualitative Character grades

Table 1 Continued.

Research Questions	Data Source		
	1	2	3
Secondary: What impact will a schedule change have on student motivation within a science classroom?	Likert scale questionnaire	Student interview questions	Teacher Journal / Character grade
Secondary: How does student self-efficacy change with a schedule change?	Likert scale questionnaire (MJSES)	Teacher interview questions	Teacher Journal/ Character grade
Secondary: How does the information from this study benefit me as a teacher and RCHS as a community?	Primary question results	Secondary question one results	Secondary two question results

Data collection for the two sections of octer sampling included the same instructional strategies and techniques to examine passing rates of the learning targets being assessed. Different students participated in octer one and two classes. The same students didn't participate in quarter scheduling. Quarter scheduling examining overall passing rates of the same learning target was examined against historical academic grades and character scores of previous students with the same science classroom taken in 2018. I was the instructor of both the octer and quarter scheduling.

Data analysis techniques for the primary question used a histogram to determine if passing rates from the quarter v octer schedule improved within a science classroom. Compounds of passing rates that make up a student's grade such as learning target grades, character grades, and individual students' overall grades were compared to determine if course length has an overall impact on student success.

Sub question one (What impact will a schedule change have on student motivation within a science classroom) was examined through a Likert scale questionnaire pre-and-post survey adopted from Pickens and Eick (2009, pp. 361-362) and validated though a qualitative student interview process. Likert scale pre-testing was administered before octer one and two begin. Post questionnaires were given on the last day of each octer. A t-test was used to determine what motivation techniques are most effective in a science classroom at an alternative high school for Likert scale testing. Interview data was gathered and themed to will support t-test results. Interviews were conducted half way through each octer.

Sub question two: Treatment was delivered through a Likert scale questionnaire (MJSES) on the first day of class at both campus, administered by core subject taught teachers (language arts, math, and social studies) to their first hour students on the first day of school in to 2020-2021 school year. A follow-up Likert scale questionnaire was delivered near the end of the first octer. Teacher interviews were conducted before the first octer and start of the 2020-2021 school and a post interview after the first octer is complete (Appendix H). Character grades where collected after the end of the first octer and compared to historical character grade input from the same campus and same class offer in the quarter format.

Delivery of the student interviews was given during class time and was conducted one-on-one with the student. This allowed for only the teacher and student to be part of the interview and no other students within the classroom. Student responses were recorded via Screencastify as the interview was being conducted. Interviews analyzed for themes at a later time after all interviews were conducted. Interview questions helped to support primary and sub questions.

Sub question three: How can the information from this study benefit me as a teacher and RCHS as a community? This was analyzed using a collective analysis of all the data being recorded within the study. Using a mixed methods approach and through triangulation,

qualitative and quantitative data with primary and sub questions one and two helped to determine overall data findings, conclusions and further discussions. Sub question three was examined from pre-and-post data recorded and observed. The cumulative mixed methods approach allowed for a reflective evaluation into scheduling and how the octer may or may not be beneficial for student's success at RCHS. This reflective evaluation was conducted after the study was over and all data had been analyzed.

Character grades were analyzed using RCHS character rubrics. Data analysis was used to determine if character grades have a significant difference in terms of overall grades earned within the term length along with an association between student motivation. Post-interview teacher questions were asked if they thought character grades increased within the octer v quarter. Historical data was not analyzed for this category since character grades are objectively graded and each student are singularity measurable units. Character grade examination will help support the primary question allow with all three sub questions.

Data analysis on interview questions and Likert scale questionaries' were stored digitally through Google Drive. Interviews were collected via Screencastify and stored on a Google Drive folder. Analysis of Likert scale questionnaires was delivered via Google Forms and collected responses were stored, sorted and organized in Google sheets. Excel was used for data analysis such as t-tests. Likert scale information was used to find common themes around students' preference on term length, motivation and self-efficacy. Accessibility to the Google platform is streamlined for students as our school district uses Google as a universal platform.

Data Collection Matrix

Through the support of RCHS and information gained through the MSSE program I was able to develop the primary and sub questions for my action research (Table 2):

- Primary Question: What is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer)?
- Sub Question One: What impact will a schedule change have on student motivation within a science classroom?
- Sub Question Two: How does student-student efficacy change with a schedule change?
- Sub Question Three: How can the information from this study benefit me as a teacher and RCHS as a community?

The data matrix describes the methodologies I used to conduct the AR study (Table 2).

Table 2. Research questions and data sources.

	Data Collection Methodologies						
Data Collection Matrix	Pre-Survey	Post- Survey	Interview	Character Grades	Learning Target Grades	Final Grade	Teacher interview questions
Research Questions							
Main Topic / Primary research question What is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer)?				2,5	1,4	1	
Sub-question #1 What impact will a schedule change have on student motivation within a science classroom?	1,2	2	2,4, 5				
Sub-question #2 How does student-student efficacy change with a schedule change?	1,2 ,3	1,2, 4		1,2 4,5			5
Sub-question #3 How can the information from this study benefit me as a teacher and RCHS as a community?	1,3	1,4	4	5	1,4	1	5

Research Timeline

Table 3 outlines the research timeline for my AR.

Table 3. Timeline for Action Research.

Timeline for Action Research	
Collect data	8/24/20 -----10/19/20 8/24/20-10/9/20 8/24/20: Pre-teacher interview 8/25/20: Pre-questionnaire on Motivational Techniques Student and Student Efficacy Scale (MJSES)- Edwards campus 9/18/20: Post-teacher interview 9/18/20: Post-questionnaire on Motivational Techniques Student and Student Efficacy Scale (MJSES)- Edwards campus 9/21/20: Collect end of octer grades and character scores 9/21/20: Pre-questionnaire on Motivational Techniques Student and Student Efficacy Scale (MJSES)- Eagle campus 10/9/20: Post-questionnaire on Motivational Techniques Student and Student Efficacy Scale (MJSES)- Eagle campus
Collet data	10/19/20: Collect end of octer grades and character scores
Analyze data	10/9/20 – 4/30/21 The goal was to take data in groups of sampling and then compare at the end 10/19/20: Have teacher interview pre-and post-analyzed with the goal of finding overall trends in motivation and engagement from quarter to octer 10/30/20: Having student self-efficacy pre-and-post put into themed groups from questions.
	11/6/20: Data analysis on student self-efficacy pre-and post-test. 11/13/20: Group science motivation pre-and-post questionnaire 11/20/20: Data analysis on pre-and-post science motivation 3/30/21: Find themes for student interviews for science motivation 12/18/20: Group passing rates for core teachers quarter and octer schedules

Validity and Reliability

Validity and reliability were insured by incorporating peer reviewed articles to include ideas and from previous studies, vetted Likert scale surveys along with using mixed methods triangulation was used to understand primary and sub questions. Validity and reliability are also measured through multiple campuses participating within the study, along with pre-and-post Likert scale questionnaires and interviews administered throughout the study. The primary question examined overall grades and passing rates within a science classroom. Using information gained through the literature review and adopting information learned through Austin and Gustafson and also Veal peer reviewed articles were used within the AR. Within the two studies, a relationship between students' grade point average (GPA) from taking different term lengths and their success by performance GPA was explored. Within both studies examination of GPA was used to compare student success on different schedule types. Likert scale questionnaires adopted through peer reviewed studies was used for sub question one and two. Sub question one (What motivation techniques are effective within an alternative science classroom), was examined through a Likert scale questionnaire pre-and-post survey adopted from Pickens and Eick. (Pickens & Eick, 2009, p. 361-362). Sub question two (What information can be gained from the study on student self-efficacy to help determine self-confidence and engagement?), a Likert scale was adopted from Morgan and Jinks Student Efficacy Scale (MJSES) (Jinks & Morgan, 1999, p. 227).

Reliability was measured through mixed methods triangulation. The primary question examines multiple measures that make up the final grade, and if a student passes the science class. Interviews provide student insight into self-efficacy toward motivation and engagement within the learning environment of a shorter grading period. This was measured within science classroom and other core subject areas. Core subject teachers were interviewed to determine if

octer format provided cross curriculum support in passing rates and self-efficacy results. Procedures used, examined subjects, research involving surveys and questionnaires, voluntary participation, anonymous responses, and risks and inconveniences. The research methodology for this AR received an exemption from Montana State University's Institutional Review Board (Appendix I).

DATA ANALYSIS

General and broad themes have emerged from the data concerning student achievement within a science class in term length, along with motivation and self-efficacy. Term length at an alternative high school revealed that term length is not necessarily a driving factor in student success or in academic achievement. Sub question one and two provide insight in motivational and self-efficacy factors that influence student achievement can have a greater impact then scheduling type.

Primary Question

The primary question for my action research was what is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer). The non-treatment group was composed of a sample size of n= 33 students and had six more students than the treatment group n=27. Total sample size N =60. This is a difference of 13.15% between the amount of student compared from non-treatment to treatment. The learning objective within the science classroom was a Colorado physical science standard. The standard examined within the class was: Newton's second law and the conservation of momentum can be used to predict changes in the motion of macroscopic objects. The two learning target grades were sub standards that made-up the overarching standard. Learning target one was to apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. For this class, the word "minimized" within the standard was substituted for "maximize." The second standard was comprised on two sub standards; analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its

mass, and its acceleration and also to use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

Non-treatment and treatment groups had similar outcomes to construct medieval weapons (flails) and use the devices they created to explain Newtons second law. Students used angular velocity and acceleration to explain Newtons law. Students also had the ability to design the flail and make revisions throughout the class. When the non-treatment group took the class the Colorado 2020 standards were not developed and different Colorado state standards were assessed. However, when adopting the new Colorado state standards the science team and RCHS aligned the new standards to the old ones and previous classes that were taught.

Grade Distribution

Grade distribution was represented through a histogram that display non-treatment (quarter) and treatment (octer) scheduling types (Figure 1). Figure 1 displays adjusted accounted scores while figure two displays complete scores. Adjusted scores are used within the AR compared to complete scores. Adjusted scores are a representation of students who missed six or less classes that counted toward students' character grades. If a student missed more than six of classes their character grade went below an 80% or 20% of an overall student grade. It is thought that gaps in learning after missing more than six classes out of 16 would result in a student earning a 62.5 percent in character score would result in students not passing a class or being able to achieve high academic scores such as high A's in two or three of the learning target grades offered each grading period to pass the class. For example, in the current grading model a student if a student missed 10 out of 16 classes their character score would be a 0.625 and account for 20 percent of their overall grade. If the student was to achieve two 3 out of 3 scores or 100 percent of two learning targets the students overall score for the class would a 93 percent.

However, if a student missed 10 out of 16 classes their character score would be a 0.625 and account for 20 percent of their overall grade. If the student was to achieve one 2 out of 3 (0.66%) and one 3 out of 3 (100%) for two learning targets the students overall score for the class would a 79 percent and they would not pass the class.

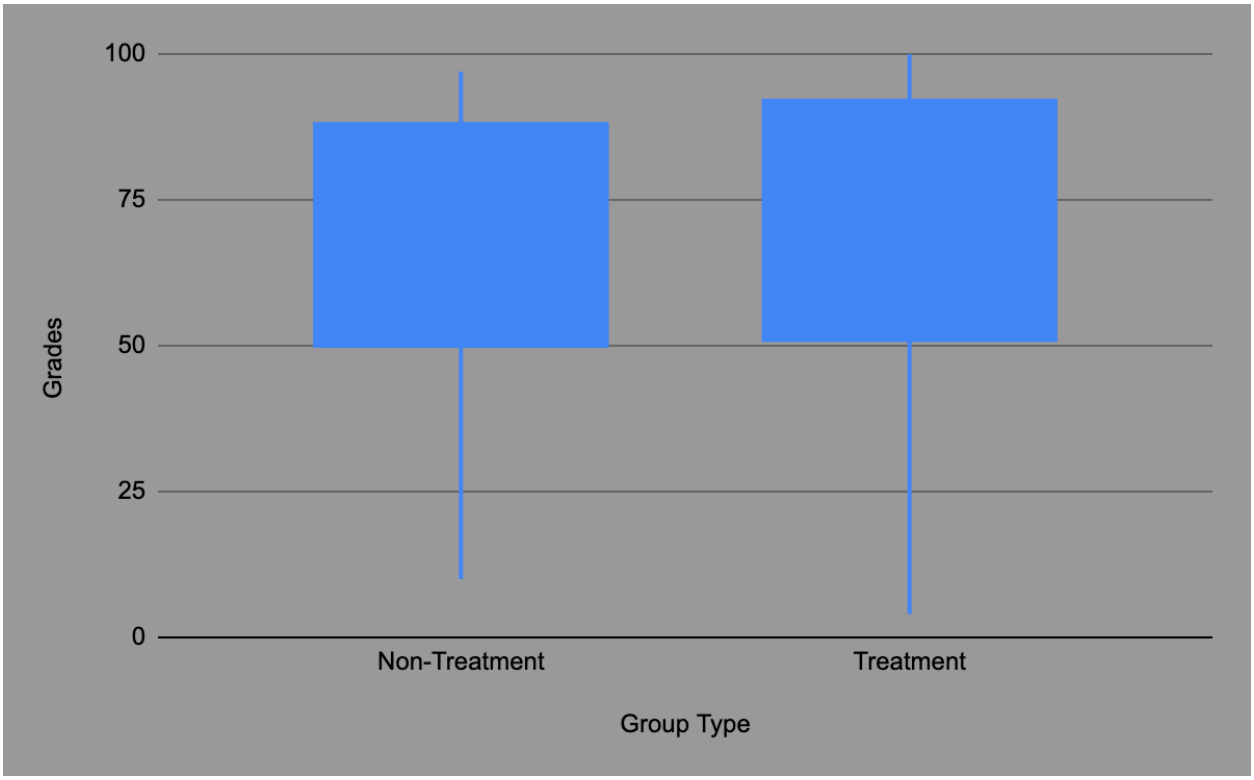


Figure 1. Histogram adjusted grade distribution for non-treatment and treatment groups, *N*= 60.

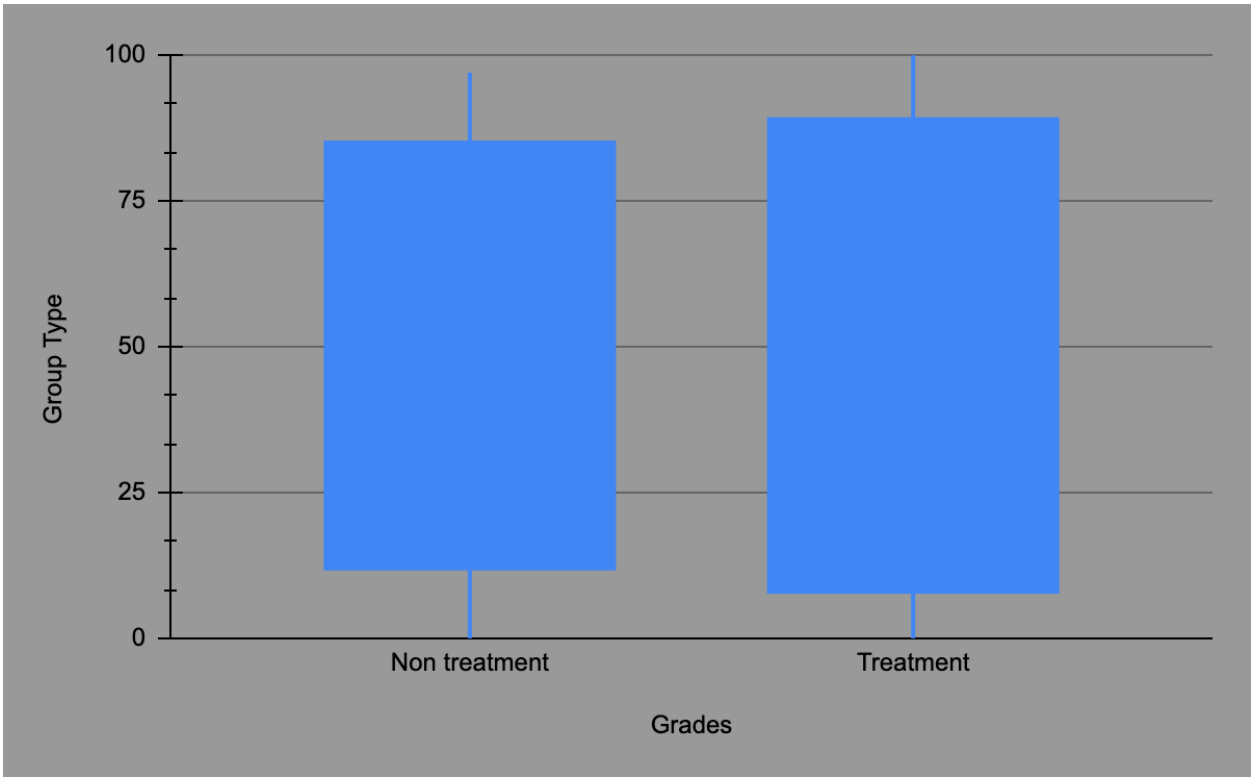


Figure 2. Non adjusted grade distribution for treatment and non-treatment groups, *N*= 101.

Adjusted scores from histogram data display that students first and third quarter range are more condensed in non-treatment (quarter) compared to treatment (octer). Distribution of overall grades in adjusted scores were slightly more diverse in range from the first and third quartile range in the treatment group compared to the nontreatment group. Students earning the highest grades were greater in treatment group compared to nontreatment groups. Students in the treatment group earned higher third quartile grades. Comparison of a normalized gain was accessed to determine if students' grades improved with the implementation of different scheduling. Normalized gain between nontreatment and treatment groups was - 4.4 percent showing that students achievement decreased slightly with the implementation of the octer format. The histogram comparison between adjusted scores explains that student scores widened slightly with the octer scheduling from the first to the third quartile of student range compared

quarter scheduling. However, some students with the octer schedule were able to achieve higher scores earning maximum and third quartile scores higher than quarter scheduling. The octer scheduling was able to increase some student performance, while increases in the entire population sampled within in a science classroom did not improve.

Passing Rates

Passing rates and grade distributions were examined to understand how students compared with different scheduling types for earning credit and how well student's achievement was scored through individual grades.

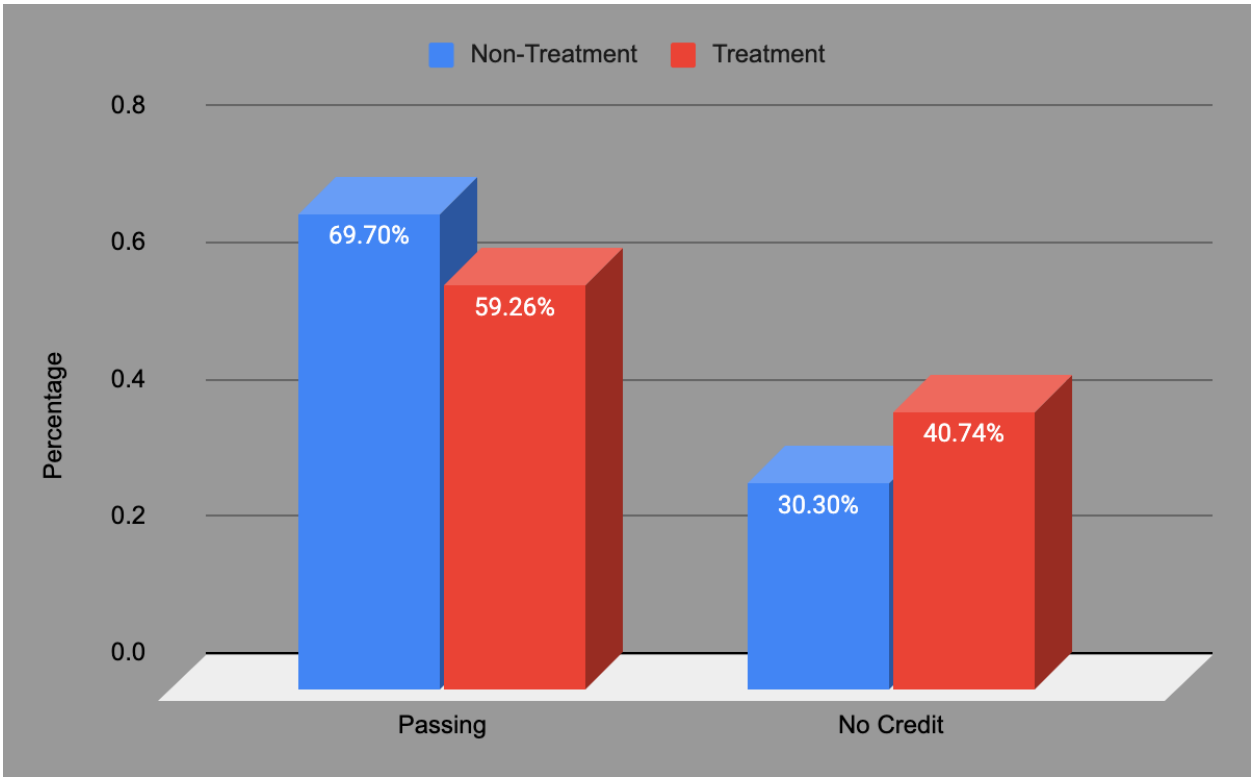


Figure 3. Passing rates for non-treatment and treatment groups, *N*=60.

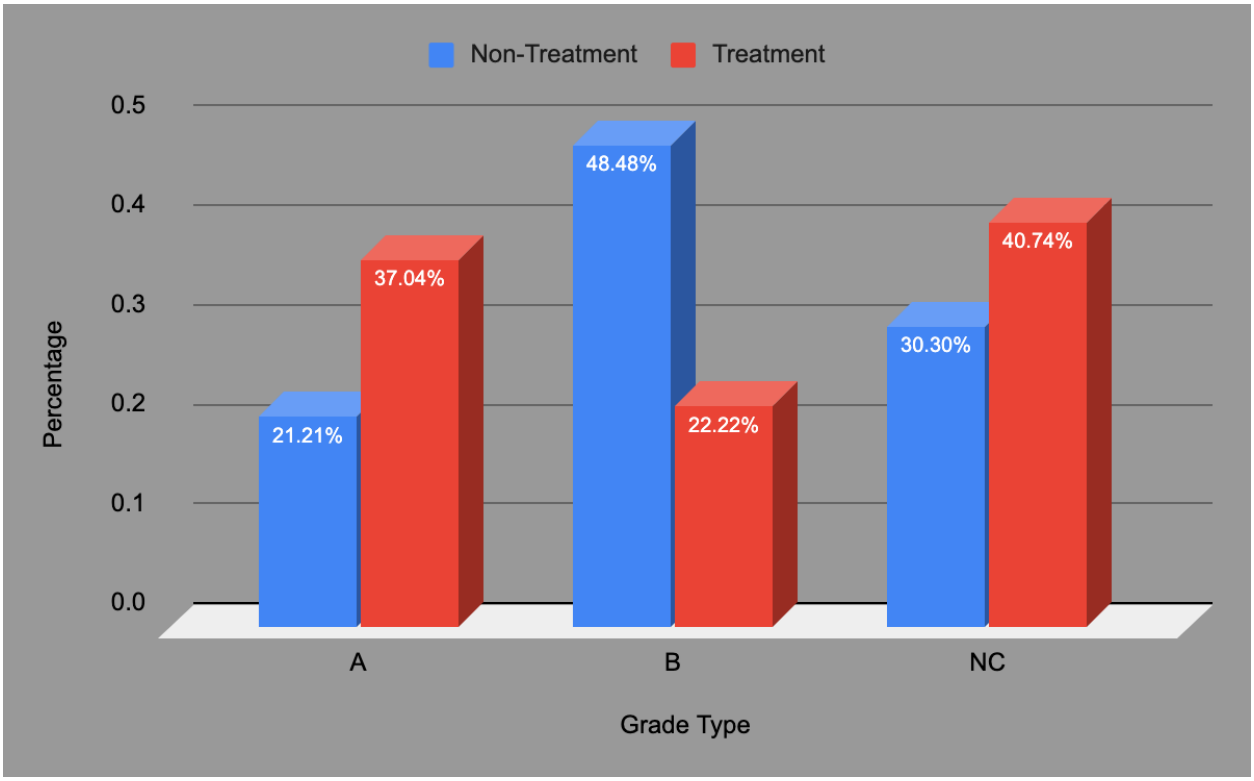


Figure 4. Grade distribution for non-treatment and treatment groups, *N*=60.

Examination of adjusted passing rates within a science classroom show that the non-treatment group had a higher distribution of passing rates within a science classroom (Figure 3). Passing rates from for non-treatment format was 69.70 while treatment format was 59.26 percent. Overall the non-treatment group had a 10.44 percent higher passing rate compared to the treatment group.

Passing rates by grade distribution show that the treatment group had a higher distribution of passing rates with students achieving A's compared to the non-treatment group, while the non-treatment group had a high distribution of B's. Students that received a no credit (NC) for the treatment group had a higher distribution of no-credits compared to the non-treatment group (Figure 4). Treatment shows more students receive higher class grades or no-

credit scores when compared to the non-treatment group. Overall grade distribution for A's, B's and NC is more even with treatment when compared to non-treatment groups.

Octor format might be more beneficial for higher achieving students which might explain the higher distribution of A's compared to the number of students receiving a NC. Higher achieving students who identity as having high self-efficacy may benefit more when it come octer format. This could be due to the fact that students who are tardy and having absentee issues will have a harder time to make up classwork or might feel overwhelmed by the pace of the octer.

Learning Target Grades

Learning targets are Colorado Academic Standards provided by the Colorado Department of Education (CDE). Eagle County Schools and RCHS have adopted the most recent state standards from 2020. Learning targets are Colorado's Department of Educations, academic standards taught. The CDE defines an academic standard as:

> Colorado Academic Standards are the expectations of what students need to know and be able to do at the end of each grade. They also stand as the values and content organizers of what Colorado sees as the future skills and essential knowledge for our next generation to be more successful. All Colorado districts are required to adopt local standards that meet or exceed the Colorado Academic Standards. The Colorado Academic Standards are also the basis of the annual state assessment (Colorado Department of Education, 2019, para 2).

The standard that was assessed was a physical science standard: "Newton's second law and the conservation of momentum can be used to predict changes in the motion of macroscopic objects" (Colorado Department of Education, 2021). Two sub standards: Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system and apply scientific and engineering ideas to design, evaluate, and refine a device that maximizes the force on a macroscopic object during a collision.

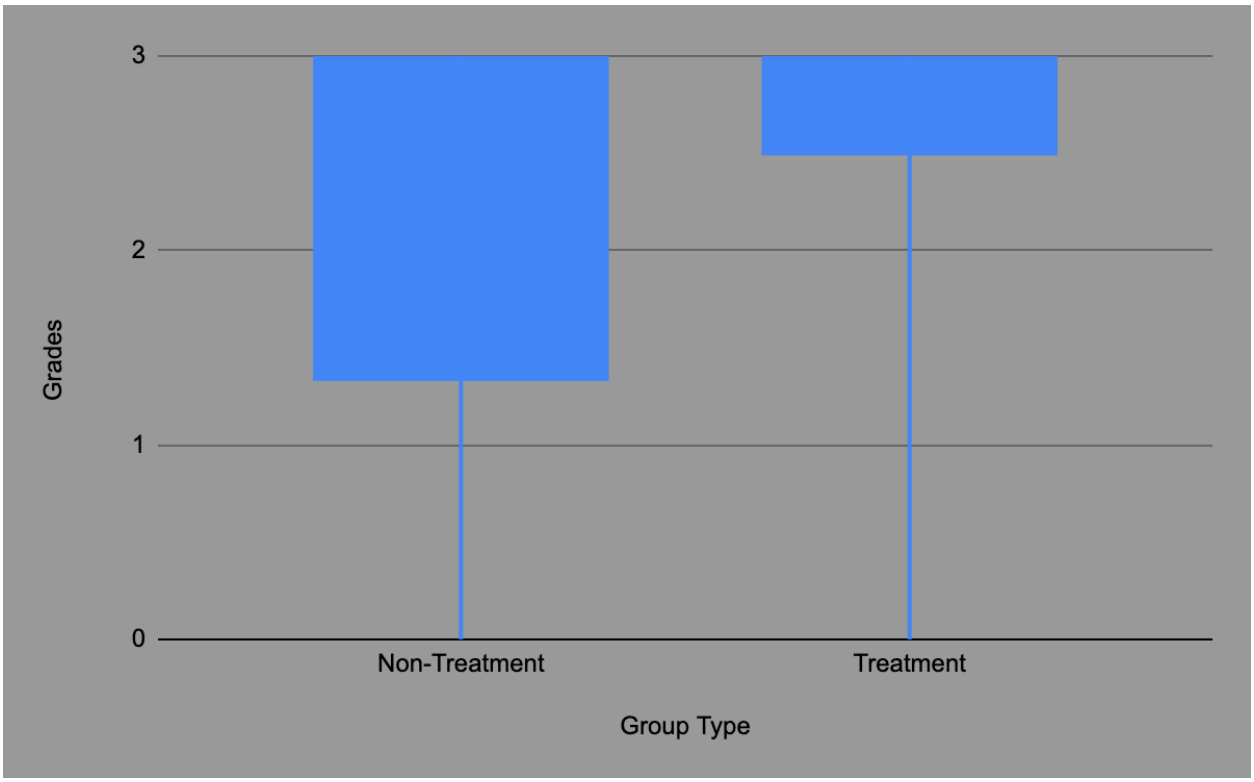


Figure 5. Learning target one grades, *N*=60.

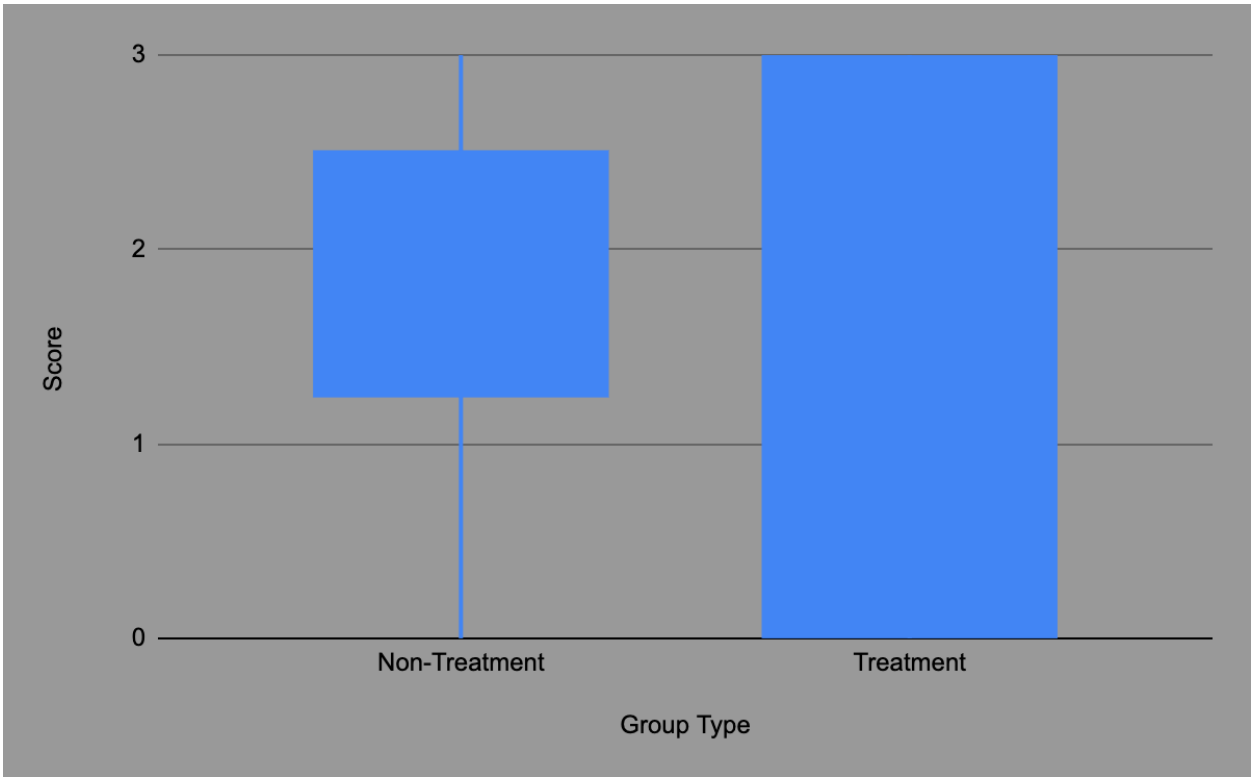


Figure 6. Learning target two grades, *N*=60.

Learning target one grades show that the treatment group was able to apply scientific and engineering ideas to design, evaluate, and refine a device that maximizes the force on a macroscopic object during a collision (Figure 5). Learning target one was an ongoing process throughout the entire class that was based upon deadlines to design refine and evaluate their flail design. The treatment group had a closer and higher distribution of scores within the first and third quartile compared to the non-treatment group. The non-treatment group had a first and third quartile range of 1.34 to 3. The treatment group had a first and third quartile range of 2.5 to 3. This closer distribution of scores show that more students were able to achieve a closer distribution of scores. Having a closer range of scores demonstrate that more students achievement and understanding of the learning target were similar than different, and thus providing greater mastery of the learning target.

Learning target two comprised students to analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration and also to use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system (Figure 6). Within the histogram grade distribution of non-treatment students had closer distribution of first and third quartile grades, demonstrating that more students within the dataset preformed within the 1.25-2.5 range. The maximum score achieved for both groups was a 3 and the lowest score achieved was a 0. The treatment group had a wide range of first and third quartile data that range from a 0 to 2.875, showing that the dataset of students had a wider range of scores distribution.

The difference between learning target one and learning target two show that it is possible that students are academically stronger at using design and engineering skills to design a medieval weapon like a flail. Application of mathematical equations and relationships science application of understanding net force on an object may be limited.

Character Grades

Character grades account for 20 percent of a student's overall grade and are inputted and interpreted from RCHS Norms. Character grades attribute to one fifth of a student's overall grade and adhering to RCHS norms could have a dramatic effect on students failing or passing a class. Histogram data compares non-treatment and treatment character scores. Character a grades are imputed on a scale of zero to three. Character grades were averaged per student and displayed in a histogram (Figure 7).

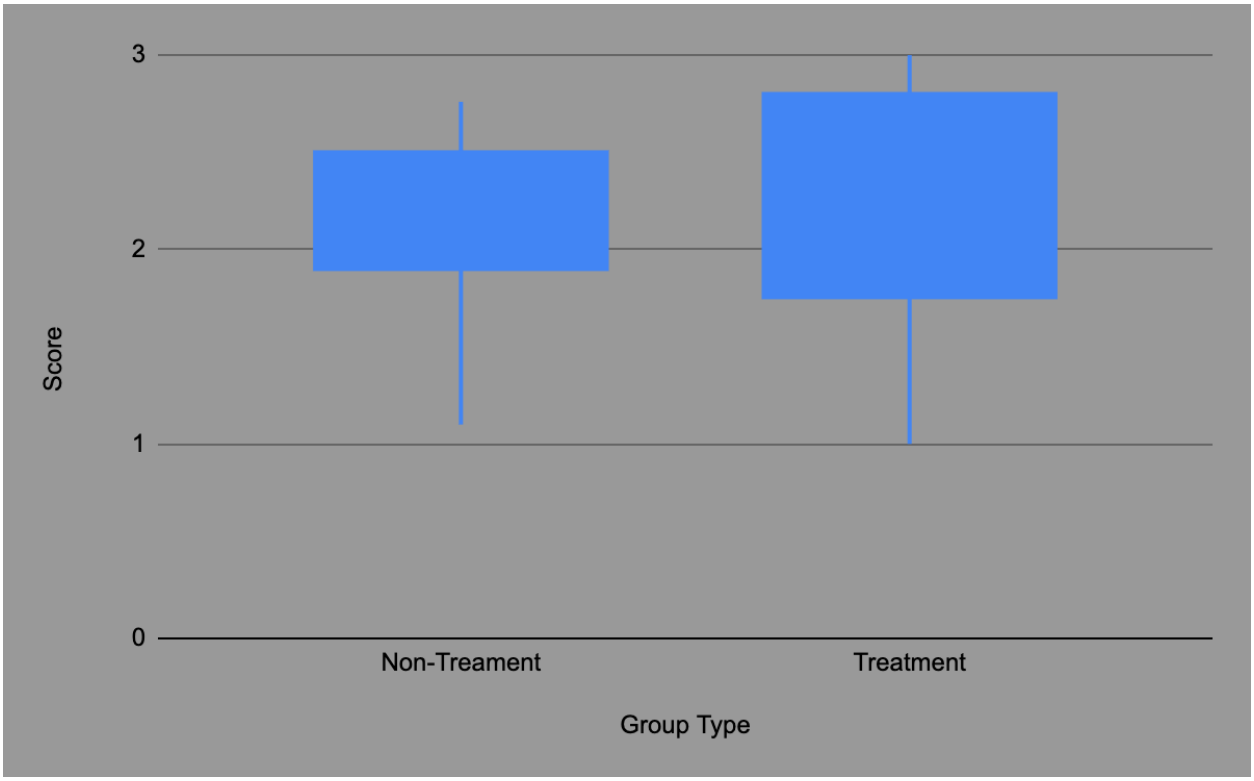


Figure 7. Character grades, *N*=60.

Distribution of character grades show that the treatment group obtained higher character score for the maximum and third quartile scores. The maximum score for non-treatment was 2.5 (83%) and treatment was a 3 (100%). Third quartile data for non-treatment was 2.5 (83%) and for treatment was 2.8 (93%). First quartile and minimum scores were very close together in distribution. The minimum score for non-treatment group was 1.1 (36%) while the treatment group was 1 (33%). The first quartile data for non-treatment was 1.9(63%) and treatment was 1.75 (58%). The range distribution of scores between first to third quartile was greatest for treatment group (1.875 – 2.9) compared the nontreatment group (1.9 – 2.5).

Since character scores greater than 2.5 are a passing grade of 80 percent having a first and third quartile range distribution close together and higher than 2.5 would provide students greater opportunities to pass a science class since character accounts for 20 percent of a student's

overall grade. Providing character regular discussions, examinations of individual students character grades, goal setting, along with a clear character rubric can be beneficial to increase character scores.

Triangulation

Examination of adjusted passing rates based off the difference in population size (six students) could have an effect on the passing rates of non-treatment group if that population sizes were the same . A 18 percent difference (+/-) in student dynamics could affect the passing rate. The passing rate for the non-treatment group was 69.7, if accounting for the 18 percent difference in populations examined and assuming that all students pass a full extreme in the positive direction would bring the passing rate to 82.24 percent or a negative full swing to 57.16. However, examination of the gap between non-treatment and treatment passing rates observed is 15.14 percent which is still greater than the 13 percent difference between the group population size compared and the passing rates observed. A 2.14 difference could be compared between passing rates if examined from a population and passing rate perspective. This perspective provides information that non-treatment passing rates/population would still be higher with a 2.14 percent difference (+/-) in student passing rates that could affect the passing rate in a full extreme in the positive direction 71.19 or a negative full swing to 68.20. Overall, quarter scheduling providing slight advantages in passing rates, when compared to learning target and character grades.

Student dynamics need to be looked at when compared to the non-treatment group populations, within the study the treatment group had 8 students who had learning support demographics (Title 1, ELL, SPED, or gifted and talented). Data on non-treatment group demographics could not be obtained since the comparison group had students that have

graduated or dropped out. Once a student graduates or drops out, the data of the student is no longer in the Alpine Achievement, which houses student demographics. Learning target one and two histogram data might show different results if compared to a population with the same demographics of students with similar demographics. However, since alternative education and Eagle County Schools demographics haven't changed dramatically from non-treatment to Treatment histogram data would be very similar.

Learning target two quartile ranges within the treatment group might be wider because students have gaps within their content knowledge within math educational background and their understanding of Newtonian laws. Student performance on learning target one might have shown greater scores compared to learning target two since learning target one was less dependent on math skills and more focused on Newtonian concepts, engineering and design. Individual student gaps in knowledge can be different from student to student and account for deficiencies in learning target two outcomes. Other gaps in learning and understanding in science terms such as force, mass, acceleration or how to use scientific formulas could be associated with decreased scores in learning target two. At RCHS gaps and deficiencies in math understanding along with higher math concepts have been a concern. Using STAR testing which is a test service to understand students math abilities, show a majority (75- 86) of RCHS students are below grade level STAR scores. This could have a huge effect on the grade distribution of learning target two when using science and math concepts together. Having a target math class that focuses on individual math deviancies and goal setting can provide greater success when applying math concepts to science and physics.

Character grades show that the treatment group had higher distribution of first and third quartile grades, however, less students passed the class compared to the non-treatment group. Treatment students were able to earn better character, however passing rates suffered possibly do

to the fact the science concepts and student placement in classes didn't match abilities to be successful within a physics based classroom.

Sub Question One

Triangulation was used for sub question one to determine what impact will a schedule change have on student motivation within a science classroom. This was examined through pre and post Likert scale questionnaires and induvial student interviews. Examination of five point pre-and-post Likert scale adopted from Perkins and Erickson (2009) was used to determine if there was a change in student self-efficacy toward science education. Student interviews were conducted to see what motivation strategies work in science education along with class grading period length.

Likert Scale Data

Examination of a change in student responses to Likert scale science self-efficacy data from pre-to-post show that students change in responses remain stable from pre-to-post questionnaire responses. Two questions were thrown out of the data set as they represented a response in the disagree direction compared to the other questions relating to the agree direction. Overall, 628 responses to 30 questions were recorded from 16 students (Figure 8). From student frequency responses, more students respond to having a positive self-efficacy to octer schedule formatting in science education. Frequency scores indicate that a seven response change in a positive direction (agree and strongly agree) or one percent of responses to the questions from pre-to-post questionnaires responses. The seven response score in the positive response rate represents a 46 percent for pre-test to 47 percent post-test. Frequency scores negative response rate changed by five responses from pre-to-post questionnaire. This represents an 18 percent pre-test to 17 percent post-test difference. The one percent shift in the positive direction

represents a change of 0.16 students from 16 students. Findings provide information that a octer format doesn't increase or decrease self-efficacy toward science education. Using a T-test to observe a 0.95 significance level found that the change was supported with a two tailed score of 2.019 and degrees of freedom at 41. The p value was 0.278. Findings from the t-test reject the null hypothesis that there is no relationship between student's motivational support for octer format. Comparison of Likert scale responses from non-treatment to treatment groups support the t-test that increased self -efficacy had didn't change from quarter to octer format.

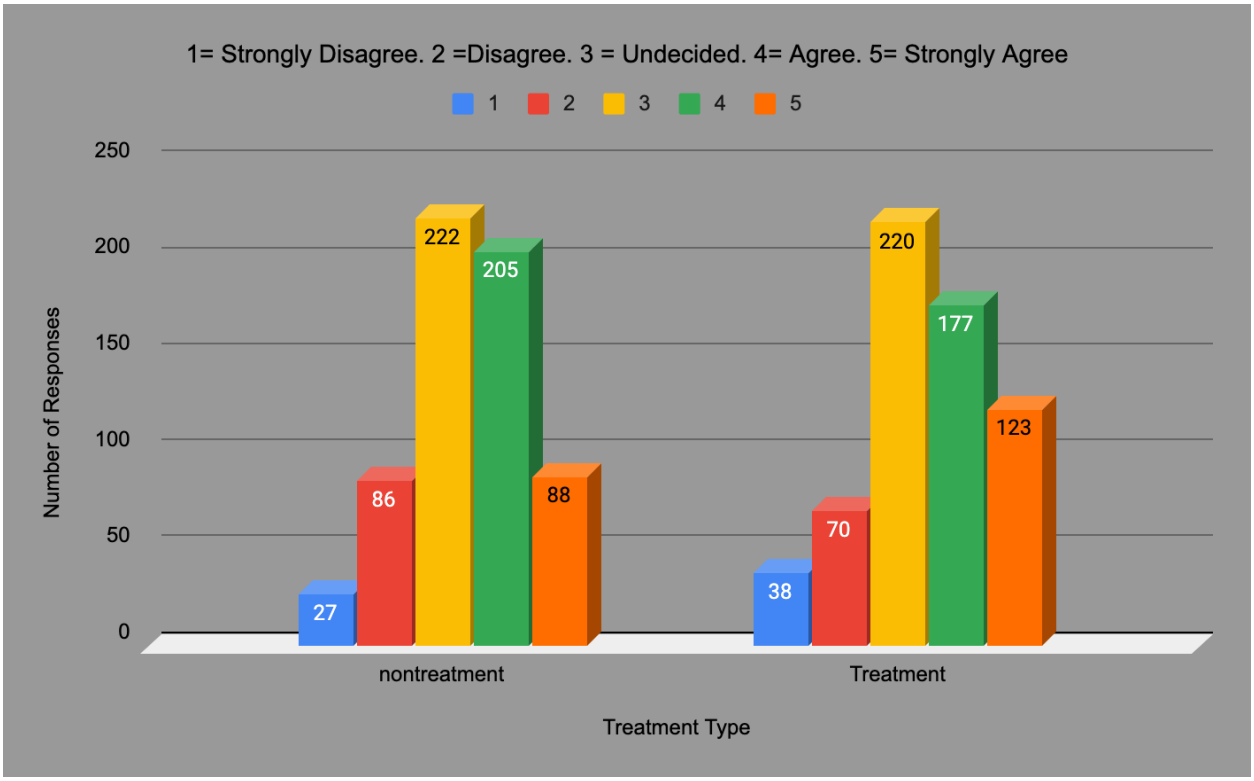


Figure 8. Likert scale questionnaire results for all questions and responses, *N*=16.

The 30 question Likert questionnaire was grouped into four categories based on perceptions toward motivation, teaching strategies, the science classroom and scheduling type. Examination of first and third quartile scores from Likert scale survey results were used to determine questions that where low or high priorities for students from post-octer questionnaire.

Answers that received an average response score of 3.29 or below was considered low while answers 3.625 and above was considered high.

Students perceptions toward the science classroom changed after the introduction to the octor format (figure 9). Six questions were over third quartile averages providing information into students' thoughts of science practices that effect motivation within a science classroom for both pre and post- test data. Students revealed that they enjoyed science education, preferred different instructional practices, often wondered how things work, enjoyed project based learning, science material in class was interesting and that inquiry within the science classroom was practiced. This is important to understand what is working for students motivation within the science classroom. Students were lacking self-confidence in that fact they think they are a good student, along with pursuing a science related career. Lacking self-confidence provide information on why a student might lack motivation in a science classroom. Lacking self-confidence in the science classroom can have possible lasting effects, in students seeking a carrier in a science related field. Students disagreed with wanting to do a worksheet when compared to preforming science inquiry. This number decreased pre-questionnaire to post-questionnaire by 2.2 percent. Students perceptions are important indicators of what science teaching strategies work best for alternative education students. It is important to note that a majority of students enjoy science, project based learning, prefer multiple types of instructional strategies within the classroom. However, students might still struggle because they lack self-efficacy to think they are good students.

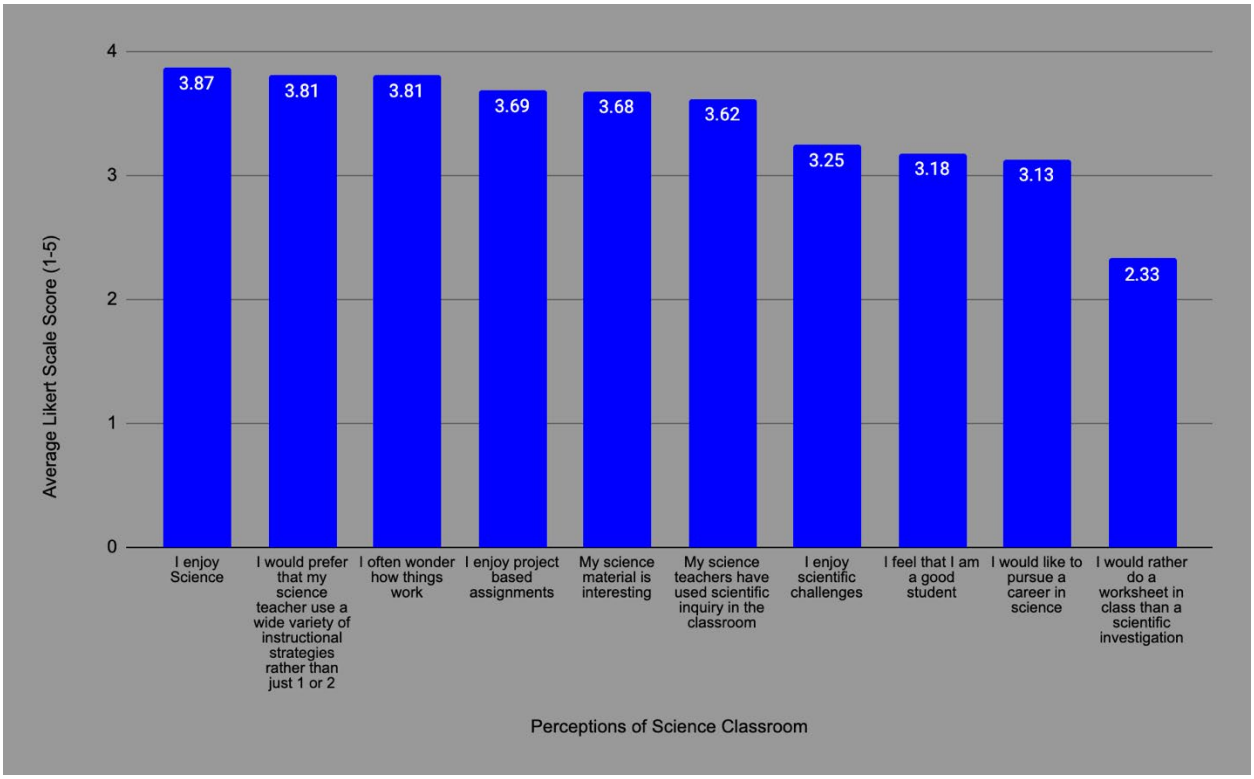


Figure 9. Themed responses to students' perceptions in a science classroom, *N*=16.

Motivational techniques provide information on what techniques do and don't work best to self-motivate students to gain achievement within the science classroom (figure 10). Findings provide information that the time spent with their teacher, the teacher enthusiasm, spending time with their friends and teachers getting to know them motivate students within a science classroom. Classroom discussion along with rewards seem to be the least effective in motivating students. Overall, students motivation as a high school student is less than when they were in elementary school.

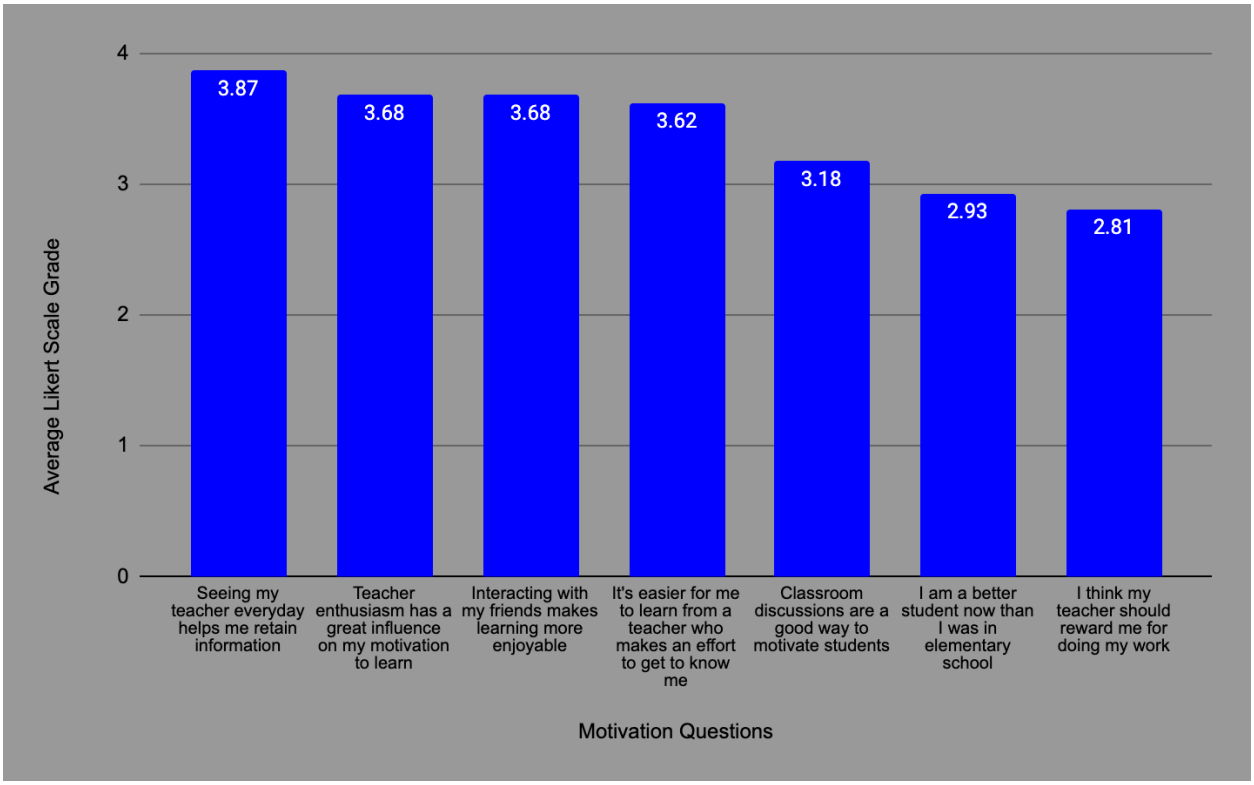


Figure 10. Themed responses to motivation perceptions in a science classroom, *N*=16.

Students' perceptions on teaching strategies that work best with a science classroom provide insight in what teaching strategies work best to motivate students (Figure 11). Class discussions along with step by step lab procedures work best. While motivational strategies that work least are working better with groups of students, and notetaking.

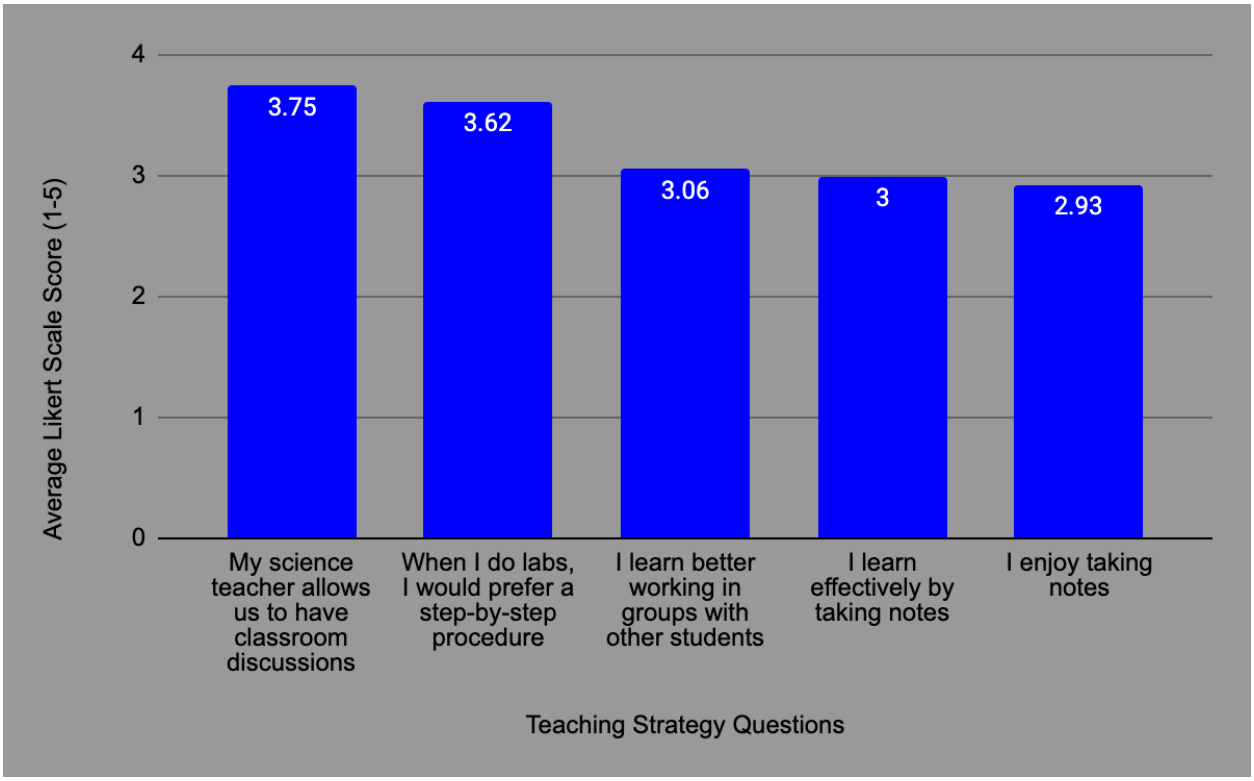


Figure 11. Themed responses to students perception on best teaching strategies within a science classroom, *N*=16.

To help determine if scheduling type was supported within a science classroom four Likert scale questions where themed. Positive scheduling type change was effected by one factor by seeing the teacher everyday helps retain information. The other three factors fell within first and third quartile range and had not direct change from pre to post questionnaire.

Student Interviews

Eight student interviews were conducted to understand students' thoughts on quarter verse octer scheduling. Understanding students' responses helped to support or deny scheduling format. Questions that were asked are located in appendix D. Only students who experienced quarter and octer format at RCHS participated in the interviews. Student responses were coded and analyzed to find trends in data and provide insight into triangulation. Question eight and nine

was the only free response that were un-coded. Positive responses were labeled with a check mark (✓), neutral responses were labeled with an equal sign (=) and negative responses were labeled with an (X).

Table 4. Coded student responses to interview questions.

Coded Student Responses to Interview Questions								
Questions Asked	1	2	3	4	5	6	7	8
Do you enjoy Science?	=	✓	✓	✓	=	✓	=	✓
Are you motivated in science class?	=	✓	✓	✓	✓	✓	=	=
Do you believe your motivation is a driving factor in your success in science class?	✓	✓	✓	✓	✓	✓	✓	✓
Are you motivated when you see the teacher and classmates everyday then every other day?	=	=	✓	✓	✓	=	X	✓
Are you engaged when you remember the scientific information?	✓	✓	✓	✓	✓	✓	✓	✓

Table 4 Continued.

Coded Student Responses to Interview Questions								
Questions Asked	1	2	3	4	5	6	7	8
Is scientific inquiry challenging?	=	=	=	✓	✓	=	X	X
What would make scientific inquiry easier?	N/A	N/A	More processing time	Breaking things down	Different teaching techniques/styles	Scaffolding instruction	Don't like scientific inquiry	Hands on learning
My last grade in science class was?	NC	NC	NC or B	B	Passed	A	NC	NC
Do you enjoy the octer scheduling?	✓	✓	✓	✓	✓	✓	X	=
Would you want to keep the octer format?	✓	✓	✓	✓	✓	✓	X	X
Do think you are a more successful student with the octer or quarter schedule	✓	✓	✓	✓	✓	✓	X	✓

Finding from student interviews reveal that when thinking about enjoyment and success in the octer format over 75 percent of students interviewed preferred the octer format and found success in the format. Students responses surrounding enjoyment of the octer format were, "within an octer it is less to remember" and "its shorter" and "I can earn more credits". All but one student interviewed felt like the octer format provided them more success in passing science class. Students responses centered around having more motivation, helping them learn, and understanding more information. Since the octer format is shorter 87 percent of students

interviewed believed that it is easier to remember scientific information if they are in science every day. Engagement increased with students remembering scientific information with 100 percent of students agreeing to this question. Only 25 percent of students found that scientific inquiry is easy. With an increase in scientific exposure through the continuation of the octer scheduling, students with gaps in learning should decrease with less time in-between science exposure based on students responses to why the octer schedule is better for learning, motivation and academic success.

Triangulation

Triangulation of Likert scale questionnaires and student interviews questions show that there is no relationship from quarter to octer scheduling types from p-value data obtained from pre-and-post questionnaires. However, when examination of individual groupings of motivational questions, themes emerged providing perceptions into, motivational techniques and teaching strategies that work best for students within the science classroom. Examination of scores higher than third quartile data along with student interview questions support higher responses to questions within these categories. Insights from these two categories of data support information that students enjoy science education, need different instructional strategies when it comes to inquiry education. Octer scheduling was supported by student interviews and student felt like octer scheduling would provide greater academic success. One student described octor formatting as beneficial because, “Information stays with them day to day”. Students also acknowledge that their motivation is a driving factor in their success with science education. Having motivational strategies that are liked by students over the third quartile of responses can guide instruction and increase motivation and engagement.

Sub Question Two

Triangulation for sub question two was based on a pre-and-post four –point Likert scale survey adopted from Morgan and Jinks, which examined 30 questions on student self-efficacy that were separated into three categories, effort (4), context (13) and talent (13). Three core teachers were interviewed pre-and-post octer to determine if motivation and engagement strategies have changed. Lastly, the three core teachers' character grades for students pre-and-post octer were examined. All of these techniques were used to determine if octer scheduling provided better student self-efficacy in terms of motivation and engagement.

Likert Scale Data

Examination of t-test results with 95 significance reveled that I would accept the null hypothesis for effort, context and talent categories that there is no perceived difference for students in motivation and engagement in grading terms from the quarter to the octer. Student receptions were collected in the 0.95 percentile on a two-tailed t-test. Effort had three degrees of freedom and reported a t-test score of 3.182. Context and talent had 12 degrees of freedom and reported a t-score of 2.178.

Taking into consideration the mean, frequency and t-test scores for all three categories (effort, context and talent), octer scheduling provides students with slight improvements in self-efficacy in motivation and engagement. Slight improvements can be seen in the increase in positive responses in the frequency from pre-to-post responses. However, the mean and frequency provide a different response to the data. Examination of these slight gains are positive in school growth mindsets of students. However, what is concerning about the negative responses are that students believe they will not graduate from high school, it is not important to

go to high school, and I am a good reading student, , and it is hard for them to get good grades. How to address these issues will have to be examined as a school to provide support around these areas (figure 12).

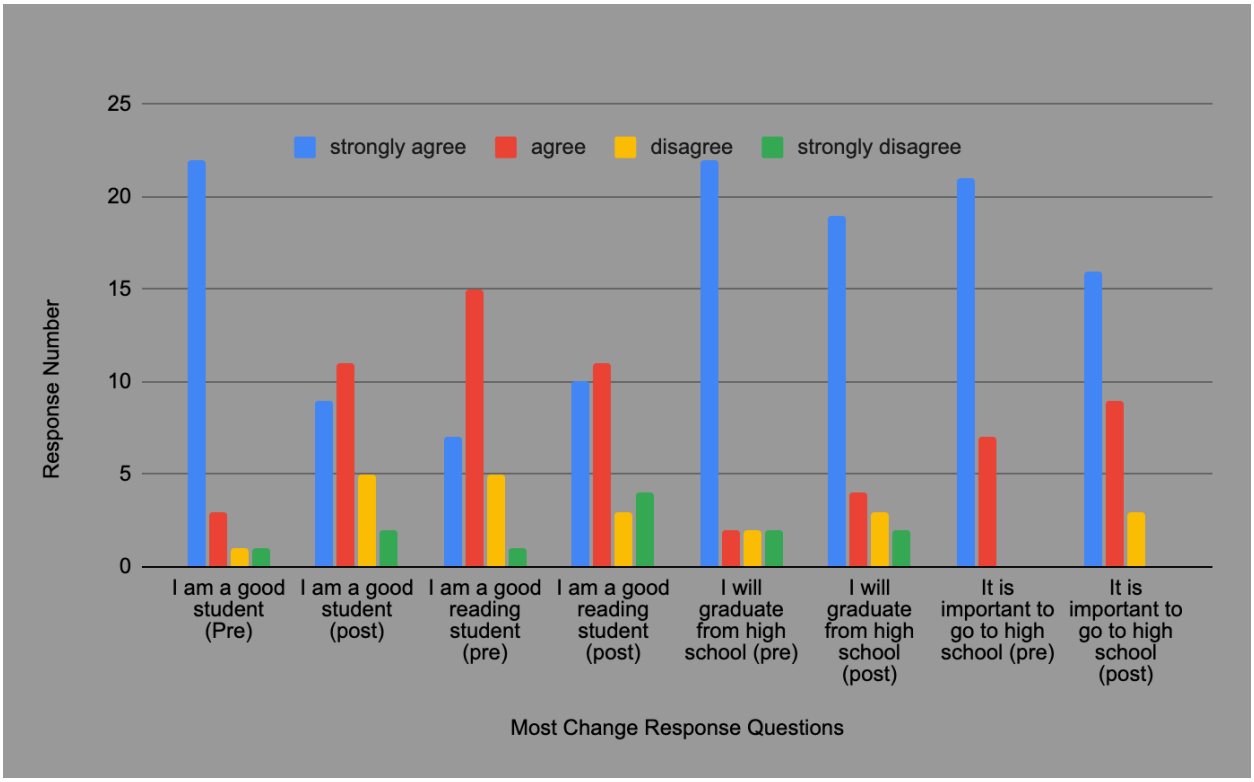


Figure 12. MJSES significant student responses for the most change pre and post questionnaire, *N*=29.

Teacher Interviews

Teacher interview themes that emerged from the language arts teacher reveled the most consistent responses from pre-to-post interviews and were based on motivational factors that included, building rapport with students is the teacher's main role to get students motivated to learn. Once rapport has been established, teacher consistency and feedback is a driving factor for motivation. Problems associated with motivation center around student attendance issues. While building, rapport is also a driving factor for student engagement. Differences among responses center around the question, "How do you know when a student is motivated?", and the

answers varied from pre-interview response in student finding success within the classroom and how that success is associated with academic happiness to post interview response of participating and trying provides academic motivation. Overall, the language arts teacher thought that character grades were input at a more consistent level in an octer compared to quarter scheduling and observed greater individual student achievements in character and academic developments with octer scheduling. Increases in both categories could be contributed to repour building activities at the beginning of each class along with the delivery of better and more frequent academic feedback.

The math teacher's answers varied more than the language arts teachers answers from pre-to-post interviews. Motivational strategies stayed the same, were student praise and extrinsic rewards. Being an effective motivator included getting to know her students to understand interests and learning styles. Student engagement helped when she got to know students and things that hindered engagement was yelling or raising her voice. Changes occurred from pre-to-post from thinking that student engagement is a 50/50 teacher student role to a main teacher role for engagement. Another change is in the pre-interview it was stated that student motivation is something we need to do, compared to the post interview in the student motivation is a big factor for student success. This is important to point out that the teacher's role in motivation has changed with a shorter-term length and possibly seeing students every day.

The social studies teacher consistency in how she saw motivation and engagement with students from a quarter to octer scheduling was the least consistent compared to the language arts and math teachers. This could be attributed to only having three years of teaching experience. Consistent items used in being an effective motivator is by being a cheerleader in supporting students. The use of incentives to motivate students allow with knowing that students are motivated when they participate in class. Providing students, a hook that is engaging can engage

students throughout the term. Things that effect student engagement were identified as possible home life struggles. Changes that were made with octer format were using feedback as strategies that work to motivate students. The physical environment of a classroom was also considered in the octer. Interesting responses to motivation were that the teacher's role should only be 30% because students have to be motivated to learn along with students have to be interested in the content. In this case octer format indicates that student motivation changes from a teacher's role to a student role.

Comparing techniques that are similar with all three teachers, feedback and personal connections are driving factors that affect motivation among students. Octer formatting revealed that teacher motivation changed for Elizabeth and Debbie. Elizabeth switched to a more teacher driven role with an emphasis on getting to know students more to make connections. Debbie switched from teacher focused to more student focused talking about student need to be motivated in content. Further investigation needs to be examined to determine why change might have happened.

Character Grades

Character grades that have been analyzed, show that character remains consistent same with a slight increase with octer scheduling (Figure 13). Quarter scheduling had an average character between language arts, math and social studies at 2.13 or a 71%. With octer scheduling the character score increased to 2.33 or a 76.6%. Knowledge that a 2.5 character will give students a great success to pass a class and is critical to obtain close to a 2.5 character score demonstrates that a slight increase in character observed with the octer format can provide students the extra percentage points to pass a class and earn credit.

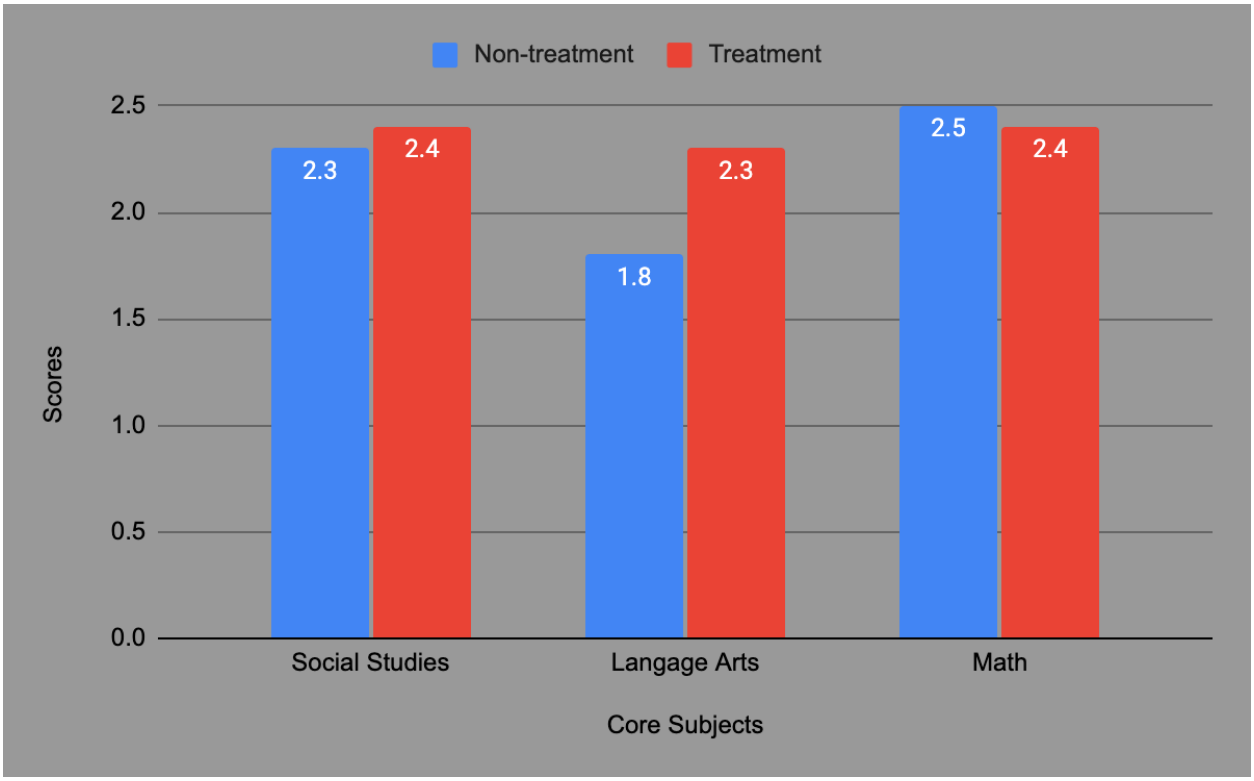


Figure 13. Average character scores for other core subjects, *N*=52.

Triangulation

When comparing student Likert questionnaire data to teacher interviews trends that emerge are students and teachers benefit from the octer schedule. Teacher, academic support or coaching around motivation and engagement strategies to enhance student achievement could be beneficial to encourage negative responses are (that students believe they will not graduate from high school, it is not important to go to high school, a good reading student, and it is hard for them to get good grades) and turn these questions into positive responses and encourage better student motivation and engagement. Although there was no drastic change in self- efficacy in the positive direction with other core subject teacher's relationship building and feedback techniques can provide encouragement for alternative students to change their perception of school. Character grades are an important factor analyzed within sub question two category of

teacher, student, school community environment and has grown with the octer format. Character grades from other core teacher and character grades analyzed through the primary question for science education show that students are meeting RCHS norms more through the octer format. This could be related to the pre- and-post questionnaires in that there is a relationship between effort and scheduling type.

Sub Question Three

General themes provided by data analysis from this AR's primary, sub question one and two provide provided general guidance to RCHS on implementations on octer scheduling and self-efficacy with a science classroom. Sub question three's focus was how the information from this study can benefit me as a teacher and RCHS as a community.

Within a science classroom the effect of scheduling type provided a slight decrease in the population being studied. However, because of the small difference in normalized gain score (-4.4 percent) and passing rates (10.44 percent) from scheduling type it might provide insight that scheduling type in a science based physical standards based class might be based off the type of science class offered. Examination of other science based curriculum classes might provide a difference in passing rates. If a school wide change was to be initiated from a quarter to octer scheduling to would be recommended that passing rates be examined from the 2020-2021 school year to previous years that the same learning targets were taught from teacher to determine if passing rates from the learning targets were greater with the schedule change.

Understanding student dynamics and class population can provide insights into content knowledge gaps and knowledge. Character grades provide insight that the treatment group were able to earn better character scores demonstrating that they are adhering to RCHS norms. The gaps in content knowledge or student ability to perform the tasks appeared between learning

target one and two demonstrated the greatest difference in the lower passing rates for the treatment group. If the treatment group were to perform at a passing rate achieved in learning target one as they did in learning target two overall academic success would have been better with the octer format.

Sub question one provides insight that through Likert scale questionnaires students motivation within a science classroom didn't change based upon the change from quarter to octer format. However, when assessing themed categories individually insight was gained into motivational strategies that a majority of students liked and disliked. This could have a deeper impact when shared throughout the science department at RCHS along with cross curriculum teachers. Knowledge of motivation and self-confidence strategies of "students perceived capability to accomplish a certain level of performance, or belief on has in being able to execute a specific task successfully" (Druckman & Bjork, 1994, p. 174) can lead to deeper academic success within a science classroom, by providing engagement, teacher strategies that works for student success.

Sub question two that students at RCHS need direct teacher support to be successful. This could be in the form of relationship building but also through academic feedback. Sub question two reveled low student's self-efficacy. As teachers build relationships and provide specific tailored feedback, than self-confidence can grow. As self-confidence grows a "person's perceived capability to accomplish a certain level of performance (Druckman & Bjork, 1994, p. 174) will also grow. Within a science classroom and with other core subjects this is also true. However, findings indicate that "there is no single simple cause underlying the problem of discouraged learners" (De La Rosa, 1998, p. 269).

CLAIM, EVIDENCE AND REASONING

Claims

The primary question examined what is the measurable impact on academic success (passing rates) through a shorter schedule at an alternative high school science classroom (Quarter v Octer). The examination of the primary question provide insight that passing rates with a octer format provide slightly less success then the quarter format. Passing rates were reduced in the octer format with a science classroom by 10.44 percent. If passing rates are lower by 10.44 percent then 10.44 percent of students are earning less credit. However, finding provide insight that gaps in learning and knowledge may be a factor through the examination of learning targets histogram data. High level science based Newtonian physics along with application of math concepts might have been a leading factor in the wide distribution of target two scores. T- test data show no relationship between octer format and academic achievement. However, the small sample size and only the use on a physical science standard be a factor in these results. With the implementation of other standards and a wider sample size results might vary. Also because of such a small sample size a 10 percent difference in passing has a low effect on overall student success of failure. Taking into account that "students come from diverse educational and cultural backgrounds and may learn a subject matter at different rates" (Brown & Saks, 1986, p.480) is important to understanding the gaps in learning and knowledge. It is also important not to lose sight over quality and quantity in education time, instruction and teacher student interaction as Astin refers to as the "locus of control" (Astin, 1999, p.528) when teaching and the octer format. Providing engaging, lessons that provide instruction to all levels of learns can be the most successful.

Sub question one examined what impact will a schedule change have on student motivation within a science classroom. Sub question one provided information that octer formatting increases student motivation when looking at themed responses individually. Examination of the entire group of question didn't support a student change in motivation. Individual themed responses give science teachers at RCHS instructional strategies that work for students to give them for motivation. Low achievement in earning credits at RCHS was a main driving force in understanding what motivated students. Information gained through the Likert - scale questionnaire fall in line with research from Pickens and Eick (2009) that "students in the lower tracked class particularly responded to teacher overtures of care, support, and praise that built up their self-confidence." (p.359). As a teacher it is important to motivate low achieving students by "frequently using interactive science teaching strategies that involve investigation and verbal discourse—such as hands-on inquiry and student–student discussion—a practice that teachers of lower ability students tend to avoid" (p.359). Likert scale responses provide insight into what motivates students and what teaching strategies are effective, "perhaps such students have not been given adequate opportunities for engaging in learning science because teachers are apprehensive of disciplinary problems that may result if they allow students to play a more active role in what and how they learn" (p. 359). To be an effective science teacher understanding who your students are and what motivates them will help accelerate achievement and motivation.

Sub question two examined how student self-efficacy changes with a schedule change. The two-tailed t-test revealed that there is no difference the way students self-efficacy is perceived from quarter to octer format for talent and context. However, teachers perceptions and teacher character grades demonstrate that they see students growing with the octer format. This could be related to students providing more effort within the octor format as revealed through the t-test findings and are supported by character grade observations. Teacher interviews provide

support for the octer format. Teachers understand that they have a deeper personal connection to students and can see that teacher students' connections translate to positive educational impacts. This aligns with literature review from Brophy, provides information on that this could be linked to teacher behavior and student achievement gains. Talent and context self-efficacy may be delayed for students within a four week pre and post questionnaire. Realized gains for self-efficacy may take some time to be fully realized. Educational impact is reciprocal process of realized gains in student self-efficacy that could increase with feedback and deeper understanding of educational, learning targets and class outcomes. Data analysis support the literature review findings from Astin the "understanding involvement with how the teacher student interaction is taking place within a science classroom can also be influenced by student's self-efficacy" (Astin, 1999, p. 518).

Value of the Study and Consideration for Future Research

Taking the information gained to this AR research provides RCHS a breath of knowledge to use to move alternative students to gain greater academic success, self-efficacy and motivation. Overall, time allocation might have an impact on student success once the realization of self-efficacy is achieved. Achieving greater student self-efficacy can be gained through tailored feedback, and building relationships with students. Alternative education attracts a greater diversity of students thus understanding where a student is academically along with personal connections is deeply import to gain academic success. Students express through Likert scale questionnaires that negative attributes surrounding school are being a good student, grading from high school, and the importance of school. It is here that time allocation and a locus of control that the octer provides to students may present a cultural change in self-efficacy and thus lead to motivation with the academic setting. Even though this studies primary question

didn't support academic success and sub question one and two reject the null hypothesis that motivation and self-efficacy increase with a octer schedule compared to a quarter schedule, all teachers interviews and 87 percent of students prefer the octer format compared to quarter format. Both students and teacher find the octer beneficial for earning credits, and knowledge and content retention. Information gained that teachers academic teaching styles changed from quarter to semester, is pivotal to why this changed. Further investigation needs to happen to understand if a change in student perceptive and/or passing rates increased with octer scheduling throughout the 2000-2021 school year.

Impact of Action Research on Author

An ongoing data progress has been shared with the team members of my action research committee. The principle of RCHS has also been involved in listening and examining data as the process has been ongoing. From conversations with my committee and the principle, direct implications of this action research could prove beneficial. Presenting data and information to RCHS staff through PLC at the start of 2021-2022 school year is the first step to understand what implications this action research could be used and beneficial to the community of RCHS. Working through the presentation that I will present at my capstone presentation I will use the same delivery to present the information to RCHS staff. I will also take the feedback from my capstone committee to enhance my presentation to the staff of RCHS.

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APPENDICES

APPENDIX A

RCHS CHARACTER NORMS RUBRIC

RCHS Norms

Respect

- Treating self and others with value

Community

- Feeling connected and including others in a group

Hope

- Having ideas and energy for a bright future

Self- Awareness

- Possessing conscious knowledge of actions, feelings and motivations

(Teaching, et. al., 2020, p. 9)

APPENDIX B

TEACHER SUPPORT TEAM

Debbie Beard – Social Studies/Business teacher

Has been teaching for four years and has her bachelor's degree in business and master's degree in education. She has provided RCHS with a college and career ready certificate program. Debbie is involved with local businesses and provides students with insight to career pathways. She is deeply involved with the student body and is motivated to all students be successful. Debbie is a great resource to have in understanding how student motivation, engagement and can influence outcomes.

Elizabeth Woods – Math teacher

Elisabeth has over 20 years of experience within education. She has her master's degree in education and a bachelor's degree in mathematics. Elizabeth is a great resource as she is truthful about her feelings toward effective strategies and outcomes on what works best for student success.

Linda Dudley – Language Arts Teacher

Linda has over 20 years of experience and has her master's degree in curriculum and development. She has won many awards for her teaching including "Colorado Teacher of the Year." Her current role at RCHS is a language arts teacher and was previously the special education teacher. Linda is a great resource to have as she understands how to adapt curriculum and instructional strategies to diverse students.

Brooke Paxton – Wife/ Significant Needs Teacher at Battle Mountain High School

Brooke has been working within the school setting for over three years within special education and is currently completing her Master's degree at Fort Lewis College. She will serve as the

editor for my action research. She has been my editor and support throughout my time in the MSSE program and has also edited my graduate work for Oregon State University and supported my thesis work at Colorado State University, which was completed in 2018.

Krista Kedrowski – High school counselor

Krista is a licensed counselor and received her degree in counseling from the University of Denver. She has over 10 years of experience within school guidance counseling. An outside core content counselor will be used to support the AR. She will be scheduling students for octer three and four. She will be helping me gather information on how students support or don't support the octer schedule. She also has access to more Powerschool (a software the district uses for grades, attendance, etc.) where she is willing to assist in data pulls for my AR.

Monica Lammers – Assistant Principle

Monica has over 20 years of experience including elementary principal, ELA teacher, and is currently an English teacher and assistant principal at RCHS. She has been a driving force for me as she introduced me to a Hexter (six-week class offering). She has provided me with insight in alternative education in terms of student diversity, learning needs, motivational strategies, and engagement. Throughout my MSSE program she has provided me with support in terms of research ideas and insight into student needs. Her door is always open for questions and insight into this AR and the over direction of how this AR my change the schedule for RCHS.

APPENDIX C

PICKENS AND EICK MOTIVIONAL SURVEY

Pickens and Eick, (2009, pp.361 – 362)

APPENDIX D

STUDENT INTERVIEW QUESTIONS

1. Do you enjoy science?
2. Are you motivated in science class?
3. Do you believe your motivation is a driving factor in your success in science class?
4. Are you motivated when you see the teacher and classmates everyday then every other day?
5. Are you more engaged when you remember the scientific information?
6. Is it easier to remember information when you are in science class every day?
7. Is scientific inquiry challenging?
8. What would make scientific inquiry easier?
9. My last grade in science class was?
10. Do you enjoy the octer scheduling?
11. Would you want to keep the octer format why?
12. Do you think you are a more successful student with the octer or quarter schedule?

*Probing will be implemented on an induvial basis. Probing will help understand deeper understanding into responses provided by the student being interviewed.

APPENDIX E

ADOPTED MORGAN AND JINKS MJSES STUDENT PRE- QUESTIONAIRE

1 = strongly agree 2 = agree 3= undecided 4= disagree 5= strongly disagree

1. I work hard in school.
   1 2 3 4
2. I could get the best grades in class if I tried enough.
   1 2 3 4
3. Most of my classmates like to do math because it is easy.
   1 2 3 4
4. I would get better grades if my teacher liked me better.
   1 2 3 4
5. Most of my classmates work harder on their schoolwork than me.
   1 2 3 4
6. I will graduate from high school.
   1 2 3 4
7. I am a good student.
   1 2 3 4
8. I go to a good school.
   1 2 3 4
9. I always get good grades when I try hard.
   1 2 3 4
10. Sometimes I think an assignment is easy when the other kids in class think it is hard.
    1 2 3 4
11. I am a good social studies student.
    1 2 3 4
12. Adults who have good jobs probably were good students when they were kids.
    1 2 3 4
13. When I am old enough, I will go to college.
    1 2 3 4
14. I am one of the best students in my class.
    1 2 3 4
15. No one cares if I do well in school
    1 2 3 4
16. My teacher thinks I am smart
    1 2 3 4
17. It is important to go to high school.
    1 2 3 4
18. I am a good math student.
    1 2 3 4
19. My classmates usually get better grades than I do.
    1 2 3 4
20. What I learn in school is not important
    1 2 3 4
21. I usually understand my school work assignments.
    1 2 3 4
22. I usually do not get good grades in math because it is too hard.

1 2 3 4

23. It does not matter if I do well in school.

1 2 3 4

24. Kids who get better grades than I do get more help from the teacher than I do.

1 2 3 4

25. I am a good reading student.

1 2 3 4

26. It is not hard for me to get good grades in school.

1 2 3 4

27. I am smart.

1 2 3 4

28. I will quit school as soon as I can.

1 2 3 4

29. Teachers like kids even if they do not always make good grades.

1 2 3 4

30. When the teacher asks a question I usually know the answer even if the other kids don't.

1 2 3 4

31. What grade in math are you expected to get at the end of this octer

1 2 3 4

32. What grade in social studies d

1 2 3 4

33. What grade in science did you get on your last report card?

1 2 3 4

34. What grade in reading did you get on your last report card?

1 2 3 4

APPENDIX F

ADOPTED MORGAN AND JINKS MJSES STUDENT POST-QUESTIONAIRE

1 = strongly agree 2 = agree 3= undecided 4= disagree 5= strongly disagree

1. I work hard in school.
   1 2 3 4
2. I could get the best grades in class if I tried enough.
   1 2 3 4
3. Most of my classmates like to do math because it is easy.
   1 2 3 4
4. I would get better grades if my teacher liked me better.
   1 2 3 4
5. Most of my classmates work harder on their schoolwork than me.
   1 2 3 4
6. I will graduate from high school.
   1 2 3 4
7. I am a good student.
   1 2 3 4
8. I go to a good school.
   1 2 3 4
9. I always get good grades when I try hard.
   1 2 3 4
10. Sometimes I think an assignment is easy when the other kids in class think it is hard.
    1 2 3 4
11. I am a good social studies student.
    1 2 3 4
12. Adults who have good jobs probably were good students when they were kids.
    1 2 3 4
13. When I am old enough, I will go to college.
    1 2 3 4
14. I am one of the best students in my class.
    1 2 3 4
15. No one cares if I do well in school
    1 2 3 4
16. My teacher thinks I am smart
    1 2 3 4
17. It is important to go to high school.
    1 2 3 4
18. I am a good math student.
    1 2 3 4
19. My classmates usually get better grades than I do.
    1 2 3 4
20. What I learn in school is not important
    1 2 3 4
21. I usually understand my school work assignments.
    1 2 3 4
22. I usually do not get good grades in math because it is too hard.

1 2 3 4

23. It does not matter if I do well in school.

1 2 3 4

24. Kids who get better grades than I do get more help from the teacher than I do.

1 2 3 4

25. I am a good reading student.

1 2 3 4

26. It is not hard for me to get good grades in school.

1 2 3 4

27. I am smart.

1 2 3 4

28. I will quit school as soon as I can.

1 2 3 4

29. Teachers like kids even if they do not always make good grades.

1 2 3 4

30. When the teacher asks a question I usually know the answer even if the other kids don't.

1 2 3 4

31. What grade in math are you expected to get at the end of this octer

1 2 3 4

32. What grade in social studies are you expected to get at the end of this octer

1 2 3 4

33. What grade in science are you expected to get at the end of this octer

1 2 3 4

34. What grade in reading are you expected to get at the end of this octer

1 2 3 4

APPENDIX G

MORGAN AND JINKS MJSES THEMED CATEGORIES

FIGURE 2
Morgan-Jinks Student Efficacy Scale (MJSES)
Subscale Items

TALENT ITEMS

I am a good science student.
Sometimes I think an assignment is easy when the other kids think it is hard.
I am a good social studies student.
I am one of the best students in my class.
My teacher thinks I am smart.
I am a good math student.
My classmates usually get better grades than I do.
I usually understand my homework assignments.
I could get the best grades in class if I tried hard enough.
I am a good reading student.
It is not hard for me to get good grades in school.
I am smart.
When the teacher asks a question I usually know the answer even if the other kids don't.

CONTEXT ITEMS

Most of my classmates like to do math because it is easy.
I would get better grades if my teacher liked me better.
I will graduate from high school.
I go to a good school.
Adults who have good jobs probably were good students when they were kids.
When I am old enough I will go to college.
No one cares if I do well in school.
What I learn in school is not important.
It does not matter if I do well in school.
Kids who get better grades than I do get more help from the teacher than I do.
I will quit school as soon as I can.
Teachers like kids even if they do not always make good grades.
It is important to go to high school.

EFFORT ITEMS

I work hard in school.
Most of my classmates work harder on their homework than I do.
I always get good grades when I try hard.
I usually do not get good grades in math because it is too hard.

APPENDIX H

TEACHER INTERVIEW QUESIONS

Teacher Questions

1. How many years have you been teaching?
2. What subjects have you taught?
3. Tell me about your professional accomplishments (advanced degrees, certifications, etc.).
4. How do you see the teachers role in motivating his/her students?
5. What strategies do you use that motivate students? Which ones are the most effective?
6. How do you know when a student is motivated? Give a few examples?
7. Comment on the importance of motivation among you (subject taught) students?
8. How are you an effective motivator? What do you do? Give Examples.
9. What factors influence motivation in your classroom?
10. What should be the teacher's role in engaging his/her students?
11. What are some problems associated with motivating your students?
12. What strategies have worked for you? Why?
13. What strategies have not worked for you? Why not?
14. Is it easier to motivate students in (subject taught) than other subjects? Why/not?

Post Questions only

15. Can you tell a difference in the character grades you imputed for students during the octer v quarter?
16. Do any students stand out in terms of character development? Give examples.
17. Do any students stand out in terms of academic development? Give examples.
18. Overall octer v quarter for RCHS? Why?

Adopted from Pickens & Eick, 2009, p.360

APPENDIX I

IRB EXEMPTION

INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

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MEMORANDUM

TO: Gregory Anderson and Walter Woolbaugh

FROM: Mark Quinn Mark Quinn CJ
Chair, Institutional Review Board for the Protection of Human Subjects

DATE: October 2, 2020

RE: *"What Are the Effects on Student Achievement with a Shorter Grading Schedule (Credits, Motivation and Engagement)" [GA100220-EX]*

The above research, described in your submission of October 2, 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:

X (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 (b) (2) 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(a)(7).

___ (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.