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Teacher Led Tier Two Intervention to Increase Student Academic Achievement

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INTERVENTION TO INCREASE STUDENT ACHIEVEMENT

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Teacher Led Tier Two Intervention to Increase Student Academic Achievement

Cynthia A. Shepherd

A Capstone Project submitted in partial fulfillment of the
requirements for the Master of Science Degree in Education at
Winona State University

Spring 2021

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Winona State University
College of Education
Rochester Education Department

CERTIFICATE OF APPROVAL

CAPSTONE PROJECT

Teacher Led Tier Two Intervention to Increase Student Academic Achievement

This is to certify that the Capstone Project of

Cynthia A. Shepherd

Has been approved by the faculty advisor and REDG 618 – Action Research: Capstone Project

Course Instructor in partial fulfillment of the requirements for the

Master of Science Degree in Education

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Approval Date:

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Abstract

The purpose of this action research was to determine if the implementation of a tier two teacher led intervention would increase student academic achievement. A small group of ten students in a ninth-grade physical science class participated in the study. Data was collected over a period of three weeks using pre- and post- intervention surveys, an exit slip for self-assessment, researcher observations, comparisons of work completion and grades from previous grading periods, participant performance self-assessment, and a goal setting activity. Results show an inconclusive connection between the tier two teacher led intervention and student academic achievement. This is possibly due to a variety of circumstances created by the COVID-19 pandemic which interfered with multiple aspects of student academic achievement. Further research should be conducted under non-pandemic conditions to determine the validity of the action research.

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Teacher Led Tier Two Intervention to Increase Student Academic Achievement

Introduction

When students struggle to meet academic expectations, educators assess possible causes of student academic challenges and evaluate methods of intervention to address those deficits. Student academic challenges can be numerous, therefore narrowing the focus of the intervention is necessary. This study seeks to determine the degree to which pedagogical caring as a tier two teacher led intervention can affect student self-efficacy towards their academic engagement and work completion in order to increase student academic achievement.

Purpose of the Study

The study is designed to investigate the impact of tier two teacher led intervention on ninth grade science students' academic achievement, specifically academic engagement, work completion, and self-efficacy.

Research Questions

The action research project focuses on answering the questions, 1) To what degree does small group, teacher attention affect ninth grade student science academic engagement? 2) To what degree does small group, teacher attention affect ninth grade science students' academic performance? and 3) To what degree does small group, teacher attention affect ninth grade science students perceived self-efficacy?

Rationale

At the beginning of the 2020-2021 school year, ninth grade science students' academic engagement was less than expected compared to previous years and has continued to decline. Academic engagement in a ninth-grade science class includes, but is not limited to, completion

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of assigned academic tasks, including reading required chapters and answering associated questions, responding to tests and quizzes in their entirety, and participation in daily discussion, in-class question and answer, and self-advocacy. Academic engagement is necessary both for student and teacher assessment of student progress with course material (Marzano, 2007).

Class participation in discussions and activities, as well as full attention to content presentation are crucial to student academic achievement (Marzano, 2007). Students who do not engage with their own learning will achieve less academically than their academically engaged peers. Self-efficacy is defined as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1994 pg. 2). In this study self-efficacy is being used to describe students’ abilities to control their own behaviors towards their academic achievement.

Definitions

The three research questions hope to reveal the degree to which a teacher can affect these aspects of student learning by using a small group tier two intervention. A tier two intervention is defined as small group instruction which is “meant to provide a limited, but targeted, support system for students who struggle to meet grade-level performance standards” (Johnson, n.d para. 3). This study focused on the half of the ninth-grade class who showed the greatest need for help to meet the grade-level expectation. Of this half of the class the exact grouping varied from day to day depending on the lesson plans for that day.

The focus of the literature review begins with research of human self-efficacy theories, more specifically, adolescent self-efficacy theory as developed by Albert Bandura. Adolescent efficacy research naturally flows to the question of adolescent motivation or apathy, as

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adolescent humans spend much of their waking time engaged in school related activities, classroom learning, athletics, or other extra-curriculars. Adolescent motivation is at the heart of discovering the effectiveness of tier two interventions effect on student academic engagement and achievement. The use of a teacher led tier two intervention relies heavily on a well-developed teacher-student relationship. The literature review discusses this importance from both a student and researcher perspective and helps to define the role of the educator as an important care-er during the adolescent years.

Moving forward through the presentation of the action research project the students who are the subject of the intervention will be referred to as participants, though the term student will still be used to identify adolescent learners in general. The teacher or educator who is undertaking the action research project will be referred to as the researcher, though the term teacher will still be used to identify the adult educator in general.

Limitations

The limitations of greatest concern during this study are duration of the intervention, participant cooperation, and researcher bias. Due to several variables outside the researcher's control, only three weeks' time have been allotted for the implementation of the intervention. Effective tier two interventions generally require six to eight weeks of data to determine effectiveness (Burns & Gibbons, 2008). This study focuses on an intervention to affect participant academic engagement, academic performance, and self-efficacy. It is not lost on the researcher that the least engaged, lowest performing, and least motivated students are the participants of this study; the effectiveness of the intervention relies on the cooperation of the participants involved. The researcher in this study is aware of personal biases that will need to be

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addresses as the intervention proceeds. The researcher has been the participants' teacher for three school years and must work to limit any preconceptions of participant capacity throughout the duration of the intervention.

Conclusion

It is the goal of the classroom educator to use the positive teacher-student relationship to implement researched based tier two teacher led intervention to positively affect ninth-grade science student academic engagement, academic achievement, and student self-efficacy during this action research project.

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Review of Literature

Introduction

The question as to the motivation of students to participate in educational expectations is one that has concerned educators across generations. Educators want their students to *want* to succeed, but even the best are at a loss when student apathy takes hold. An educator who is a “fixer” may try to analyze individual students or an entire class in an attempt to identify causes of apathy and mitigate them or the educator may try to find an incentive for accomplishment and apply it to the problem. Ultimately student success or lack thereof lies with the students themselves however many educators are left disheartened by a perceived failure on their part. A “back to basics” approach may prove to solve two problems, increasing student participation in their education while decreasing educator discouragement.

Student Self-Efficacy

A “back to basics” approach leads to understanding basic student needs. In his paper “A Theory of Human Motivation,” Abraham Maslow (1943) begins by saying “I conceive this lack of sound facts to be due primarily to the absence of a valid theory of motivation (p. 372). This paper goes on to outline the series of needs that become the well documented Maslow’s Hierarchy of Needs, beginning with basic needs or physiological needs. An individual must have the physiological needs of nutrition, water, shelter, etc. satisfied before they can consider additional undertakings. “If all the needs are unsatisfied, and the organism is then dominated by the physiological needs...The receptors and effectors, the intelligence, memory, habits, all may now be defined simply as hunger-gratifying tools. Capacities that are not useful for this purpose lie dormant or are pushed into the background” (Maslow, 1943 p. 374). Another basic need to

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consider is safety, both physical and mental safety. Regarding children in particular, Maslow writes, “Another indication of the child's need for safety is his preference for some kind of uninterrupted routine or rhythm. He seems to want a predictable, orderly world...Perhaps one could express this more accurately by saying that the child needs an organized world rather than an unorganized or unstructured one” (Maslow, 1943 p. 377).

The challenge faced in many classrooms is the inability of the educator to influence the physiological needs of the students outside the school environment, (Maslow, 1943). The school may provide meals, shelter, and a daily routine while the student is present, however there is no guarantee that those needs will continue to be met in entirety when the student is not at school. It is commonly understood that the instability of a student’s home life may severely affect their motivation to complete educational expectations. During the COVID-19 pandemic educators had even less ability to influence the needs of students, many of whom spent a considerable amount of time distance learning from home.

Maslow’s theory continues that after the basic needs are met, psychological needs may be sought after, namely love and feelings of belonging, along with esteem and feelings of accomplishment. “If both the physiological and the safety needs are fairly well gratified, then there will emerge the love and affection and belongingness needs...He will hunger for affectionate relations with people in general, namely, for a place in his group, and he will strive with great intensity to achieve this goal” (Maslow, 1943 p. 381). Further, Maslow suggests “satisfaction of the self-esteem need leads to feelings of self-confidence, worth, strength, capability and adequacy of being useful and necessary in the world. But thwarting of these needs

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produces feelings of inferiority, of weakness and of helplessness. These feelings in turn give rise to either basic discouragement or else compensatory or neurotic trends” (Maslow, 1943 p. 382).

Albert Bandura’s 1994 publication entitled “Self-Efficacy” states, “Perceived self-efficacy is defined as people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives” (Bandura, 1994 p. 2). Within the classroom the educator does have a level of influence towards student esteem, accomplishment, and belonging (Bandura, 1994). In this regard, the “back-to-basics” focus on student efficacy has been well supported. A classroom educator focusing on the development of student self-efficacy towards educational and academic goals will effectively create a positive feedback loop of goal achievement, esteem, and accomplishment leading directly back to increased efficacy. “People who have low self-efficacy for accomplishing a specific task may avoid it, while those who believe they are capable are more likely to participate” (Artino, 2012 p. 78).

As daunting as this may seem, Bandura does provide a framework of four starting points or sources of self-efficacy, mastery of experience, vicarious experience, verbal persuasion and social influence, and physiological and affective states (Bandura, 1997). As students succeed at learning a task or educational material that mastery of experience creates self-efficacy of knowing that they have accomplished something and therefore they can likely accomplish future similar activities. “The most effective way of creating a strong sense of efficacy is through mastery experiences” (Bandura, 1994 p. 2). The classroom educator does this in a variety of ways everyday reinforcing previously learned material through review while adding new content, a basic scaffolded framework of education.

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Self-efficacy by vicarious experience, defined by Bandura as, “Seeing people similar to oneself succeed by sustained effort raises observers' beliefs that they too possess the capabilities master comparable activities to succeed” (Bandura, 1994 p. 3), is readily observable amongst high school students through experiences such as social media, video games, and peer interaction. This source of self-efficacy is driven by a sense of competition amongst peers and the need for group acceptance. “Children tend to choose peers who share similar interests and values. Selective peer association will promote self-efficacy in directions of mutual interest, leaving other potentialities underdeveloped” (Bandura, 1994 p. 11). To the observant educator this developmental aspect of adolescence can be used in a positive way in the classroom by encouraging group work and praising content mastery, the goal being encouragement of desired academic achievement.

In addition to mastery of experience, teachers rely heavily on verbal persuasion and social influence, unfortunately according to Bandura, “It is more difficult to instill high beliefs of personal efficacy by social persuasion alone than to undermine it. Unrealistic boosts in efficacy are quickly disconfirmed by disappointing results of one's efforts” (Bandura, 1994 p. 3). Thus, using verbal persuasion to promote student self-efficacy is highly dependent on the teacher-student relationship. Wentzel's (1997) longitudinal study of students' academic achievement as a product of perceived pedagogical caring, surveyed a group of students in sixth grade and again in eighth grade, to determine whether their perception of teacher caring correlated with academic achievement in terms of grades. The survey to support the hypothesis that students who believe their teachers cared about them have a tendency towards greater academic motivation and higher grades. These students described caring teachers' behavior as making special efforts,

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communication (talking and paying attention to you), equitable treatment and respect, and asking about personal, non-academic issues, among other similar items (Wentzel, 1997 p. 415).

Song, Bong, Lee, & Kim's longitudinal study of perceived social support showed that while parental support was the best predictor of academic motivation and achievement, parental support was also the greatest cause for student academic anxiety (Song, Bong, Lee, & Kim, 2015). Positive peer support provided students with the best strategies for dealing with academic anxiety and work avoidance when peers had similar values and motivating factors. Song, et al found that teachers were not regarded as highly as an emotional or social support for adolescent students in comparison to parents. Teachers who set mastery goals, showed expertise in the content, and showed enthusiasm for teaching were found to have the greatest impact on student academic motivation and achievement in comparison to parents and peers (Song, et al, 2015).

In contrast to student efficacy, it is also beneficial to understand adolescent apathy in general and as it applies to their academics as was studied by Riconscente in her 2007 dissertation, "School Related Apathy in 8th and 10th Grade Students." Riconscente first sought to understand and define adolescent academic apathy in comparison to adolescent apathy. She found academic apathy to be characterized as "individuals' general disposition toward academic tasks according to whether their goal is to learn the material well, or to appear successful;" the difference between mastery/learning versus performance/completion (Riconscente, 2007 p. 20). Asking students to rate statements such as "I try to work just hard enough to get the grade that I need in a course" and "I might cut class if I think that the lecture material will not be on the test," she found a positive correlation between high ratings of these statements with low academic goal setting, low energy investment in academic work, and high work avoidance of school related

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activities (Risconscente, 2007 p. 20). Risconscente's work relied heavily on Handelman's 1999 "Adolescent Apathy Inventory," an 81-item student self-assessment inventory, however the original Adolescent Apathy Inventory was unable to be accessed during this literature review. Risconscente's summary reports that Handelman's dissertation both "represents an important contribution to our understanding of apathy in young people" as well as shows that is difficult, perhaps impossible to separate adolescent academic apathy from general adolescent apathy due to the high degree of interconnectedness of school related activities to adolescent socialization time (Risconscente, 2007 p. 26).

Attempting to better understand adolescent motivation and apathy from a student perspective, Debra Graves's doctoral dissertation, a phenomenological study, focused on direct questionnaire and interview responses of twelve eighth grade students whom she did not know. The participants were chosen from a social studies class of a cooperating teacher using academic data (grades) and teacher recommendation, as well as willingness of students and their parents to participate in the study (Graves, 2018).

The results of this study yielded five general repeating themes amongst student responses, as seen in the attached table (Graves, 2018 p. 95):

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Table 3

Description of Themes

Theme	Description
(1) Organization	Ability to write down assignments and keep a neat and organized binder.
(2) Self-Satisfaction	The feeling of accomplishment and feeling good about oneself after a job well done.
(3) Expectations	What parents believe a student can accomplish, what students believe parents should do to help them achieve, and what students expect of themselves.
(4) Goals	Aspirations about what students hope to accomplish on a daily, weekly, yearly basis.
(5) Hindrances	Things in students' life that prevents them from accomplishing tasks.

In summary, Graves's study showed overwhelmingly that self-described motivated students shared characteristics of wanting and needing to maintain organization to achieve their own goals and expectation. Motivated students felt high levels of self-satisfaction upon accomplishing their goals as well as meeting parents and teachers' expectations of them. Motivated students also reported that there were times when they were initially unmotivated to complete schoolwork or were distracted by technology, games, friends, or recreational activities. however, all of them fell back on concern for the consequences related to failure to achieve their goals to refocus their energies. In contrast to the motivated students, self-described unmotivated

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students showed opposing characteristics in all five theme areas. Unmotivated students did not use planners or technology to maintain academic organization and reported little or no satisfaction at accomplishing goals or tasks at school. Unmotivated students said their parents had low or no expectations of specific grades or other academic achievements and students were also ambivalent as to personal expectations of themselves. When unmotivated students did not want to do homework or attend class they just chose not to, without concern for the consequences and were very likely to allow themselves to be distracted by technology, games, friends, and other recreational activities (Graves, 2018).

Pedagogical Caring

Responding to the possible causes of lack of student motivation can also take a “back to basics” approach in the form of relationship building with students. Many of the studies that were read for this literature review report teacher-student relationships as being an important part of student motivation and efficacy (Artino, 2012; Bandura, 1997; Flamer, 2001; Graves, 2018; Song, et. al, 2015; Wentzel, 1997). Research to understand the role of the teacher-student relationship, or pedagogical caring, seeks to uncover the degree to which student perception of care from their teachers affects their school performance and what do students perceive as caring from their teachers (Wentzel, 1997).

Wentzel’s (1997) longitudinal study of students’ academic achievement as a product perceived pedagogical caring surveyed a group of students in sixth grade and again in eighth grade, to determine whether their perception of teacher caring correlated with academic achievement in terms of grades. The survey to support the hypothesis that students who believe their teachers care about them have a tendency towards greater academic motivation and higher

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grades. These students described caring teacher behavior as “making special efforts, communication (talking and paying attention to you), equitable treatment and respect, and asking about personal, non-academic issues, among other similar items. “Results suggest that perceptions of caring teachers are related to students' academic efforts and to their pursuit of prosocial and social responsibility goals. These relations were robust when students' previous motivation and performance, and current control beliefs and distress were taken into account” (Wentzel, 1997 p. 415). The difficulty here, however, is building a robust relationship when those previous factors are not in ample supply. How does a teacher build a supportive and caring relationship with a student whose previous motivation and schoolwork performance are less than expected? What are the ways that a teacher shows their students that they care that will not be dismissed by the adolescent student as ingenuine?

From a teacher’s perspective, dedication to the content they teach and adhering to the teaching requirements of their state standards is a way that teachers show they care about their students’ education. This aspect may be lost on students whose maturity may not understand that there are professional expectations on their teachers. From a student’s perspective, often it is the teacher who gets off track with stories and fun whom they like or connect with best. The teacher may find this to be the easy way to get students to like them or think they are cool, however that teacher may have a difficult time expecting students to perform in a more academic capacity once the fun is over. Ultimately however, “Commitment requires steadfastness to the relationship, even in difficult times, by both the one caring and the one cared for” (Hawk & Lyons, 2008 p. 319).

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Students may perceive their elementary school teachers to be more caring or more attentive to their emotional needs than their middle school or high school teachers. From their perspective a teacher is a teacher, their only difference is that they have moved up in numerical grade level. From the elementary teacher's perspective, they have perhaps only twenty or twenty-five students with whom they spend most of the day. There is ample time to hear stories from students and learn in their inner workings while still covering academic standards. "In the faculty-student (second circle) relationships, class size may or may not limit or constrain caring behavior as the caring relationship could manifest in a one-to-one exchange or in a one-to-several exchange" (Hawk & Lyons, 2008 p. 320). From a middle school or high school teacher's perspective, they may see upwards of one hundred or more students throughout the day for a limited class period. This does not make the aspect of trust and caring of the student less important, however the time constraints do make it more difficult to allow for a natural evolution of the student-teacher relationship of caring to take place. The teacher may try to make up for this time constraint with a more obvious or heavy-handed approach to showing that they care for their students. "I do not need to establish a deep, lasting, time-consuming personal relation with every student. What I must do is to be totally and non-selectively present to the student—to each student—as he addresses me. The time interval may be brief, but the encounter is total" (Noddings, 2003 p. 180). As students mature as they move up through high school, they may have a better understanding of these challenges to building a genuine student-teacher relationship and are better able to participate and reciprocate said relationship. Younger students however may see these challenges as a teacher who does not care for them the way they would want or expect "...they may not be in a position to clearly know what constitutes a caring encounter or

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they may have some reciprocal responsibilities that could be the catalyst for a caring encounter to take place or raise the level of care in the existing encounter to an acceptable level” (Hawk & Lyon, 2008 p. 332).

Additionally, adolescent students are at a point of achieving autonomy over much more of their surroundings. Adolescents begin to realize there is little actual consequence to them when choosing certain behaviors. Teachers and parents may want and expect a particular level of academic success and participation, however there is little they can do outside of the boundaries of the established relationship with the student to affect these behaviors. Teachers may lead, persuade, or coax a student towards academic goals, but in the end the student will learn and apply the information that they find most significant (Noddings, 2003, p. 176).

Nel Noddings addresses the roll of the teacher as the “one [who is] caring” and describes that role as an “inclusion” with the student. “The teacher receives and accepts the student’s feelings toward the subject matter; she looks at it and listens to it through his eyes and ears,” for the teacher to most effectively care about the student’s learning, the teacher must become inclusive with that student’s motives and intentions towards their education (Noddings, 2003 p. 177). The teacher’s caring is not the only requirement of successful caring pedagogy; the student, as the “one cared [for]” must be responsive to the caring to show that it has been received. It is difficult for teachers to continue to give caring under circumstances where that caring is not accepted as such or is seen as unwanted or even hostile (Noddings, 2003 p. 181).

Marcia Scott Wright’s 2014 doctoral dissertation found observational evidence that despite teacher’s evidence-based practice using motivational teaching strategies and attitudes, the tenth and twelfth grade students who were interviewed still reported performing just well enough

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to pass their classes and working well below their academic ability. Wright's recommendations include, "building intrinsic motivation by promoting student autonomy, challenging students to explore their own interests..." reexamine to the importance of self-efficacy and its necessity in adolescent academic achievement (Wright, 2014 p. vi). Twelfth grade students interviewed by Wright reported being internally motivated to excel at athletics but relied on external reminders from their teachers to complete academic work (Wright, 2014 p. 81). When asked about academically motivational strategies, tenth grade students interviewed by Wright responded, "that group work, choosing their own topics, and working on the Internet for research were all motivational to them. They also responded positively to selecting their own group members and methods of presentation. However, these students produced little evidence in their classwork that these strategies were effective in increasing their motivation. They continued to resist challenge and submit work their teacher considered below their ability levels" (Wright, 2014 p. 83).

It is apparent that many unmotivated learners prefer classes where physical activity, building or construction, or a great deal of topic freedom is involved, however, many of these same learners are also unable to describe an area of interest that their teachers might use for freedom of exploration within school content. Students reported having little or no intrinsic motivation especially when the content relies heavily on textbook reading, and writing.

Unfortunately, very little secondary school learning lends itself completely to physical or hands on learning, there are times when reading and writing are a requirement of the learning process (Wright, 2014 p. 100).

Science class frequently uses project based learning or hands-on activities; however, it is not possible to always do a lab activity. There is a great need in science class to focus on content

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specific vocabulary and concepts without which a hands-on activity becomes merely a craft project to complete or a game without connection to the entirety of the topic. Fortunately, science lab activities naturally become small group activities that lend themselves well to the concept of a tier two intervention. The teacher naturally circulates around the room from group to group giving small group instruction, demonstration, or reteaching concepts as needed. In this format, more motivated students will typically work together to solve problems, thereby freeing the teacher to spend more time with less motivated students.

Tier Two Intervention

The tier two intervention that is being used in this project is based on the Response to Intervention model, hereafter referred to as RTI. RTI does have many methods of organization, common models being a three or four-tiered approaches, as is described by Barnes and Harlacher (2008). Tier one instruction is large group instruction in a general education classroom that occurs during a typical period, in this study being a fifty-five-minute class period. Tier two instruction is reserved for students found to need additional instruction for a variety of reasons. These students receive the additional instruction within the general education setting, however separated into a small group, often arranged by need or ability level. Tier two instruction can take multiple forms as required by the needs of students (Barnes & Harlacher, 2008; Buffman, Mattos, & Weber, 2009). This study focuses on the tier two intervention of teacher led direct instruction to a small group of unmotivated learners. Additional tiers would be implemented based on individual student needs but will not be considered for the duration of this action research project.

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Whilst choosing an effective tier two intervention it is necessary to recall the action research project's focus questions, 1) To what degree does small group, teacher attention affect ninth grade student science academic engagement? 2) To what degree does small group, teacher attention affect ninth grade science students' academic performance? and 3) To what degree does small group, teacher attention affect ninth grade science students perceived self-efficacy?

Academic interventions frequently begin with an on-task behavioral goal designed to create a structured environment to reduce student disruption to "...make students more available for learning" (Rathvon, 1999 p. 114). Once the students are open to learning, the teacher must determine the type or types of academic problem of each student receiving interventions.

Rathvon (1999) divides academic problems into three categories, skill deficiencies or inadequate master of skills, fluency problems or rate of student learning, and performance problems.

"Performance problems refer to academic problems in which the student possesses adequate skills and fluency but does not produce work of satisfactory quantity, quality, or both for some reason" (Rathvon, 1999 p. 114). For this action research project, the researcher has identified performance problems as the area of focus, however recognizing that some students may also require skill and fluency support independent of this action research project.

Fidelity of implementation of an intervention is a highly discussed topic regardless of which tier or method the intervention takes. Fidelity of implementation consists of developing a set of protocols and checklists that allows all parties involved to implement the chosen interventions in the same manner, every time the interventions are used, regardless of who is applying the intervention or to whom the intervention is being applied (Mellard, 2010; Miller, 2010; and Florida Department of Education, 2010). "If we are not consistent and accurate, how

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do we explain the student's lack of response? Or for that matter, a student's excellent response?

If we have not implemented the protocol as intended, we cannot attribute a good or poor response to that protocol. We cannot link student outcomes to instruction" (Mellard, 2010 p. 3).

Fidelity of implementation, or lack thereof, can easily become a limitation to the outcome of an intervention.

An important aspect of fidelity of implementation of the tier two intervention must be followed with proper assessment of that intervention, "...data are collected perhaps weekly and include more specific measures...rather than just an outcome measure" (Riley-Tilman & Burns, 2009 p. 135). The data collection tools for tier two interventions can be selected from lists of possible assessment tools (Burns & Gibbons, 2008; Owocki, 2010; and Rathvon, 1999). This action research project's data tools include student self-reflection and questionnaires, researcher observation, and quantitative assessment of grades and are detailed in the "Methods" chapter of this paper.

Conclusion

The literature review focuses on three aspects considered to be a "back-to-basics" approach to education. First, understanding that adolescent student self-efficacy or motivation will have a substantial affect on student academic achievement. Adolescent students are most influenced by their peers, secondly by parental expectations, and thirdly by teacher expectations. Students who have high expectations from parents will tend to gravitate towards peers who also perform highly academically and will therefore have greater self-efficacy and motivation (Bandura, 1997; Graves, 2018; Risconscente, 2007). Second, although teacher expectations are reportedly least impactful on student self-efficacy, teachers will be most effective with their

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influence when students perceive them to be genuinely caring and committed to student success.

Developing a trusting teacher and students relationship requires sincere interest between both parties and a timeline that cannot be rushed. Students may be less inclined to engage with a teacher whom they perceive to have disingenuous interest in them as people (Hawk & Lyons, 2008; Noddings, 2003; Wentzel, 1997). Finally, any intervention that a teacher wishes to use towards improving student academic outcomes should be both researched based and include fidelity of implementation checks at various points during the intervention. Tier two interventions ideally will be used in a small group setting, several days per week for at least twenty minutes each day and run for a period of six to eight weeks (Barnes & Harlacher, 2008; Mellard 2010; Rathvon, 1999).

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Method

Introduction

This chapter includes information detailing the subject, participants, researcher role, setting, research questions, data collection, and instruction for this action research project. The subject is class subject, grade level, and circumstances under which the action research took place while the participants are the individual students and basic attributes thereof. The researcher role discusses the involvement of the researcher with the participants and addresses researcher bias of the participants. The setting is both the physical location and demographic as they relate to the action research project. The research questions are reviewed in greater detail as the data collection procedures are introduced and connected with the research questions. Data collection procedures and instructional methods outline the detail of how these tasks were conducted throughout the action research project.

Subject

The subject is a ninth-grade science class during the 2020-2021 school year. The ninth-grade science class had been divided into two groups of eleven students each, group A and B due to restrictions related to COVID-19. The study will focus on a teacher led tier two intervention with group A. Group A was chosen due to the higher number of students in that group who failed first and/or second and/or third quarter grading periods. The researcher, though involved in the creation of class groups, did not make the final decision as to student group placement.

In group A there are two students with an IEP, one with a 504, one receiving speech services, one receiving ELL services, and six students who receive no educational support services through the school. The ethnic breakdown of this group is three students of

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Hispanic/Mexican ethnicity and eight Caucasian students. In group A there are five female and five male students, there are no full-time distance learners in this group.

No specific incentive or motivational strategies were used to induce cooperation with the action research. Reminders of state requirements for adolescent high school attendance and state requirements for high school graduation were the only general motivators and these were directed towards entire class.

Participants

Participant A1 is a male student who has struggled with task and work completion throughout his years with this teacher. He enjoys reading for pleasure but prefers to learn by listening. During distance learning portions of the 2020-2021 school year his attendance began poorly and eventually he stopped joining required synchronous video classes due to little or no support at home. His science grade percentages for the first three quarters were 6%, 0%, 18% respectively.

Participant A2 is a male student with an IEP who has struggled with task and work completion during his time at this school. He does not enjoy school and prefers physical tasks and activity to reading or hearing information. During distance learning portions of the 2020-2021 school year his attendance was intermittent for required synchronous video classes despite the expectation of attendance from his home support. His science grade percentages for the first three quarters were 33%, 38%, 64% respectively.

Participant A3 is a male student with a history of completing academic work, however hurriedly without putting forth his best effort. He enjoys learning outside of the classroom by watching documentaries and enjoys arguing until he knows he is right or has “won.” He is less

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interested in learning in the classroom in a formal setting. During distance learning portions of the 2020-2021 school year his attendance for required synchronous video classes was good, but the participation was poor. He admits to turning the sound and microphone off so he could do other things while still receiving attendance for classes. His science grade percentages for the first three quarters were 57%, 18%, 68% respectively.

Participant A4 is a female student with a history of working to complete her assignments and do her best. She struggles with academic concepts, but generally does want to succeed and asks for help when she needs it. During distance learning portions of the 2020-2021 school year her attendance began poorly and eventually she stopped joining required synchronous video classes due mental health issues. Additionally, when the school district returned to hybrid learning and eventually fully in-person learning, her attendance did not improve. Her science grade percentages for the first three quarters were 25%, 2%, 26% respectively.

Participant A5 is a female student receiving ELL services. Last year was her first year at this school, also her first year living in the United States. During the previous school year she was academically at the top of her class, however during distance learning portions of the 2020-2021 school year her attendance was poor, and her attention was rarely on course content. Her grades for the first three quarters were lower than expected compared to the previous school year, 70%, 74%, 54%.

Participant A6 is a female student with an IEP who has struggled with task and work completion throughout her years with this teacher. She is argumentative with tasks she does not want to do and will shut down under pressure to perform. During distance learning portions of the 2020-2021 school year her attendance was average for the required synchronous video

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classes however her attention and participation were poor. Her science grade percentages for the first three quarters were 28%, 21%, 25% respectively.

Participant A7 is a female student whose past academic achievement has been at the top of her class. During the 2020-2021 school year her attendance and participation were essentially nonexistent regardless of distance or in-person learning methods. Her science grade percentages for the first three quarters were 24%, 0%, 9% respectively.

Participant A8 is a male student with a history of completing academic work, however hurriedly and then asking for ways to improve his grades after the fact. He has high academic potential as well as a strong home support system. During distance learning portions of the 2020-2021 school year his attendance for required synchronous video classes was good, but the participation was poor. When questioned about doing other activities rather than participating in class he denies it even in the face of evidence. His science grade percentages for the first three quarters were 82%, 76%, 78% respectively.

Participant A9 is a male student who has failed to qualify for special education services several times throughout his academic years and was held back one year during elementary school. He struggles with reading but learns well by listening and asking clarifying questions. During distance learning portions of the 2020-2021 school year his attendance for required synchronous video classes was good, but the participation was poor. When questioned about doing other activities rather than participating in class he changes the subject or redirects to blame classmates even in the face of evidence. His science grade percentages for the first three quarters were 66%, 66%, 63% respectively.

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Participant A10 is a female student with a 504 plan who is new to the district this school year. No history of previous academic work is known. Her attendance during distance learning portions of the 2020-2021 school year started out poorly but improved as the year progressed. Her work completion and participation during distance learning was far below average, however one-on-one discussion shows that she has learned material that is presented, though usually a day or two behind her average classmates. Her science grade percentages for the first three quarters were 75%, 36%, 63% respectively.

Researcher Role

The researcher in this study is a forty-year-old female in her sixth year of teaching. The researcher became a teacher after a mid-life career change and has only experienced teaching in the setting described in the next paragraph. Due to the nature of the school setting, the researcher is the only science teacher that the participants have had during seventh, eighth, and ninth grade years, apart from transfer students. Having taught the participating students for three school years the researcher is aware of many biases, both positive and negative that have affected the study. The researcher is keenly aware of students' habits, interests, and family dynamics which can subjectively affect the teacher's expectations of certain students under certain conditions. The researcher is also aware of student personalities and traits that are more compatible with her own personality, leading to more attentiveness to students she perceives to be more likable than others. It is necessary for the researcher teacher to exercise patience and fairness during class time as a whole and more specifically within the parameters of the intervention. On a positive note, the researcher, having invested three school years into building relationships with the students, is able to have more comfortable, natural interactions beyond classroom banter and

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course content discussion. The researcher has spent time learning about student interests beyond their academic abilities and is able to leverage that information to show genuine interest in the students and their paths to success.

The researcher also recognizes a bias regarding the science content being taught during this action research project. The researcher's area of undergraduate study was biology and life science; the state of Minnesota's ninth grade science standards requires instruction of earth science, introduction to chemistry, and introduction to physics content (Minnesota Department of Education, n.d). This discrepancy between the researcher's area of expertise and the ninth-grade content requirements occasionally leads to a lack of confidence on the part of the researcher when presenting said content, irrespective of the amount of lesson preparation.

Setting

The setting for this action research project is a rural, one section school, in southern Minnesota. A one section school can be defined as having only one teacher per subject in middle school or high school or only one teacher per grade level in elementary school. Rural school may include one or more small towns or townships within the district boundaries as well as those from adjacent school districts who may open enroll according to state statute. It is worth noting for the purpose of this research that there is a clear majority demographic in this school district of families and individuals whose obligation to education is indifferent at best, bordering on opposition to state mandated education of minors.

Additional setting information includes the specific classroom where the majority of ninth grade science learning takes place. The classroom serves as both a classroom and general laboratory space that needs to accommodate all science content as prescribed by the State of

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Minnesota, including life sciences, earth sciences, chemistry, and physical sciences. Additional learning space for ninth grade science class may include outdoor spaces or school hallways during hands-on learning activities. The students have access to their 1:1 school provided device, Apple iPad, as well as blanket WIFI coverage inside and partially outside the school building.

Research Questions

This study focuses on three broad research questions, 1) To what degree does small group, teacher attention affect ninth grade student science academic engagement? 2) To what degree does small group, teacher attention affect ninth grade science students' academic performance? and 3) To what degree does small group, teacher attention affect ninth grade science students perceived self-efficacy?

When considering the first research question, the teacher researcher considers the preference of many teachers to deliver content in a way that provides back-and-forth engagement between the learner and the teacher as the content is processed, manipulated, and ultimately understood. To have students who sit silently or stare off into space while the teacher drones on with content is not the joy that learning should be. Also, while useful as formative assessment devices, textbook reading and homework problems are not the way that the teacher researcher wishes to engage her students in science content. Academic engagement can be as simple as asking a question for clarification or making a joke about a poorly drawn diagram on the whiteboard. It is this type of engagement that teachers crave and hope to instill in their students. This type of academic engagement is much more difficult to accomplish in a lecturer format but is well suited for tier two interventions when there are several small groups with fewer students.

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As an individual with many years of post-secondary education, considering the question as to what constitutes good academic performance on the part of adolescent students must be reevaluated after considering personal biases. The researcher recognizes that not all the ninth-grade students are four-year university bound; many will be satisfied to maintain full time employment after high school graduation. Good academic performance logically follows attentive academic engagement, so the focus of the intervention is naturally drawn back to affecting question one, with the results of question two displaying characteristics of a dependent variable. Keeping in mind a broad goal of high school graduation and a diploma, ninth grade students are encouraged to reflect on their academic performance and determine if they are on track with their specific goals. Encouraging goal setting that relies on academic performance is a personal process that is well suited to taking place in a small group or as one-on-one conversations.

Self-efficacy is a complicated component of an adolescent's development. Research indicates that parents and peers often have the most influence over a student's perception of self and that teachers are categorized mainly as a function of academic efficacy with little effect on non-academic endeavors. By deliberately taking time to implement individual and small group relationship building early in high school, the teacher researcher hopes to see a long-term impact on student self-efficacy. The question as to effect of a three-week intervention on adolescent perceived self-efficacy remains to be seen.

Data collection procedures

Data collection for this action research project consists of nine tools, three tools for each of the three research questions, pre- and post- intervention participant surveys, an exit slip for

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participant self-assessment, a tally of researcher observation, comparisons of percent work completion and grades from previous grading periods, participant performance self-assessment, participant goal setting activity, and a selected focus group individual participant interviews. The purpose of this data collection format, or triangulation matrix, is to gather data for each research question using multiple techniques and from multiple points of view. The overlapping data can then be used to determine the degree to which the small group teacher led intervention affects student academic engagement, student academic performance, and student perceived self-efficacy.

Table 1

Triangulation Matrix

Research Questions	Data Tool A	Data Tool B	Data Tool C
Q1- To what degree does small group, teacher attention effect ninth grade student science academic engagement?	Pre- and post-student survey*	Exit slip, self-assessment of daily engagement	Teacher observation of engagement in class
Q2- To what degree does small group, teacher attention effect ninth grade science students' academic performance	Comparing work completion quantity from previous quarters to current quarter	Comparing grades from previous quarters to current quarter	Student performance self-assessment
Q3- To what degree does small group, teacher attention effect ninth grade science students perceived self-efficacy?	Pre- and post-student survey*	Goal setting activity	Selected focus group of individual interviews

*Survey included items to address both research questions 1 and 3 as one document to preclude participant survey fatigue.

The planned data tools for answering the first research question consist of a pre- and post- intervention participant survey, an exit slip for participant self-assessment of engagement

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to be administered periodically throughout the duration of the intervention, and a tally of researcher observation of participant engagement periodically throughout the duration of the intervention. It is important to note that while the survey included items to address both research questions one and three as one document to preclude participant survey fatigue, the researcher presents the data from this survey separately for each of the questions it addresses.

The pre- and post- intervention participant survey will determine if there is any change in participant self-perception of academic engagement. Participants completed a survey before the intervention began and completed the same survey when the intervention period had ended. This survey to determine participant academic engagement was made using nine items taken from Risconscente's 2007 doctoral dissertation. All survey items were answered using a 1-4 Likert scale, 1 strongly disagree, 2 disagree, 3, agree, 4 strongly agree. A 1-4 scale was chosen to eliminate neutral or non-decisive answers. The survey was presented to participants as a Google Form and was completed during class time using their 1:1 school provided iPad device. Participant data is considered complete and included in the data analysis section only if the participant completed both the pre- and post- surveys. Results from pre- and post- participant surveys can be compared to determine if there is any change in the participants' level of academic engagement after the completion of the intervention.

The exit slip participant self-assessment of daily engagement consists of three items developed by the researcher. Item one asked participants to rate on a scale of 1-4 how well they engaged in their science education for that day, 1 being very unengaged, 2 unengaged, 3 engaged, or 4 very engaged. Item two asked participants to indicate their best success in science class for that day. Item three asked participants to indicate the thing they would most like to

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improve upon for the next time. The exit slip was distributed periodically during the intervention period and was used to encourage participants to reflect on their individual academic engagement for that day. Exit slip results were arranged by date and data and were analyzed for trends and themes for each participant to determine the degree that the intervention affected the participant's academic engagement for the period of the intervention.

The researcher observation of participant engagement consists of periodic tallying to determine if there is an increase, decrease, or no change in amount and type of participant engagement in science class. Amount of participant engagement would be determined by frequency of interactions during class time. Types of participant engagement could include, but not be limited to, answering or asking questions, contributing to class discussion, academic interaction with peers, and note taking. Types of participant engagement may also include non-academic engagement like off topic interruptions and generally disruptive behaviors. The researcher had initially planned to record both quantity of positive engagement interactions as well as type of interaction, however without the support of an in-class note taker this proved difficult to do while still teaching lessons as planned. Participant engagement is a subjective measure and is based strongly on researcher knowledge of the participants, for example a naturally introverted student who is attentive, but does not ask questions in class would be considered to have engaged in an amount typical for that participant. Conversely, a participant known to be generally talkative and sociable who then does not participate on a given day may be considered to have engaged in an amount less than typical for that participant. On the days where participant engagement was tracked, the researcher indicated the following possible symbols on a printed class roster:

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- Plus sign (+) for positive, on-topic engagement, of an amount greater than was typical for that participant
- Capital letter x (X) for positive, on-topic engagement, of an amount typical for that participant
- Minus sign (-) for negative, off-topic engagement, or disruption to class
- Zero (0), for non-engagement, or significantly less than was typical for that participant
- Capital letter (A) for participant absent on that day

This observational system for tracking participant engagement was suggested by an intervention specialist colleague of the researcher. This observational data should show trends in participant academic engagement during the intervention period.

The planned data tools for answering the second research question, consist of a comparison of quantity of participant work completion throughout the school year, a comparison of participant end of quarter grades throughout the school year, and participant performance self-assessment.

Participant work completion, defined as the number of missing assignments, activities, or tests per grading period, is quantitative data that is recorded in the researcher's grading software provided by the school district. The researcher's school district uses the Infinite Campus software which has tools available for school staff as well as user portal access for individual students and their families. Students and families are all provided with login information and may check their own data, including posted assignments, grades, attendance, etc. as needed. The researcher can access Infinite Campus at any time to review or input data. Participant work

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completion data for each grading period was gathered from Infinite Campus and organized on a class roster spreadsheet. This quantitative data will show any decreases in the amount of missing participant work as well as increases or no change.

Participant grades from the first three grading periods of the school year will be compared to participant grades at the conclusion of the intervention to determine if the intervention contributed to some change in participant overall grades. The grading scale used by the school district for high school students is a 90-80-70-60, A-B-C-D, grading scale where 60% is a D- and is the lowest percentage possible to pass a class and earn credit towards graduation. Grading for this class is calculated using points received divided by total number of points possible. The end of the intervention coincides with mid-quarter grading. The researcher gathered participant quarter and mid-quarter grade percentages from Infinite Campus and organized it on class roster spreadsheet. This quantitative data will show any increase in the participant grade percentage as well as decrease or no change.

The participant self-assessment of their performance was designed by the researcher to encourage the participants to assume responsibility for tracking their own completed work and grades as posted in Infinite Campus. This data tool, if used correctly should not yield results different from the two quantitative data tools described by the researcher in the previous paragraphs. Participants will access their data using their provided Infinite Campus portal and record their own data. Awareness of their grades and work completion provides a point of connection between student academic engagement and student self-efficacy.

The planned data tools for answering the third research question, consists of a pre- and post- intervention participant survey, a goal setting activity, and selected individual participant

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interviews. It is important to note that while the survey included items to address both research questions one and three as one document to preclude participant survey fatigue, the researcher presents the data from this survey separately for each of the questions it addresses.

The pre- and post- intervention participant survey will determine if there is any change in participant perception of self-efficacy. Participants completed a survey before the intervention began and completed the same survey when the intervention period had ended. This survey to determine participant perception of self-efficacy was made using fifteen items taken from Risconscente's 2007 doctoral dissertation. All survey items were answered using a 1-4 Likert scale, 1 strongly disagree, 2 disagree, 3, agree, 4 strongly agree. A 1-4 scale was chosen to eliminate neutral or non-decisive answers. The survey was presented to participants as a Google Form and was completed during class time using their iPad. Participant data is considered complete and included in the data analysis section only if the participant completed both the pre- and post- surveys. Results from pre- and post- participant surveys can be compared to determine if there is any change in the participants' perception of their self-efficacy after the completion of the intervention.

The goal setting activity asks participants to choose three specific goals to address their fourth quarter self-efficacy, academic engagement, and academic performance in science class. Participants were given a list of eight goals to choose from directly or to modify, or they were allowed to come up with their own goals. The goals listed are similar to those used on Individual Education Plans (IEPs) and were written by the researcher on the advice of a special education teacher. The participants chosen goals serve as a starting point for awareness of their self-efficacy and how it pertains to academic performance and engagement.

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The final data collection tool for this research question are interviews of select individuals from the intervention group. Whereas the participant survey consists of items measuring participant self-efficacy, the Likert rating scale does not allow for nuanced answers from the participants. Individual interviews can provide answers to questions of why, how, or other processes that cannot be easily measure on a rating scale. The interviewee can also ask clarifying or follow-up questions to gather more data if necessary. Any participant interviews will be conducted on a volunteer basis only to help participants avoid any stigma or emotional discomfort.

Planning for validity, reliability, and trustworthiness of the findings may be a concern with some of the data collection tools. There are concerns that the participants will not be truthful when filling out surveys, exit slips, or goal setting. If the participants can be assured that these items are anonymous and not tied to grades there is hope for more trustworthy findings. The validity of the survey data depends highly on asking questions in clear, unbiased, non-leading ways. Throughout the literature review many examples of survey items have been presented from which the data collection tools have been drawn. Using these items provides the ability to check results against similar theories. Additionally, taking the time to conscientiously record data in a timely manner at each collection point is an important part of the data collection process. The reliability of results being reproducible may be difficult to ascertain given the circumstances of COVID-19's effect on this school year. The researcher or others could take this action research and apply it at a future time with the same students or with different students, however the uncontrollable conditions will be difficult to account for at any other time.

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Instruction

During the first half of the 2020-2021 school year, the students had been attending school with full-class, synchronous, online learning four days per week with Friday reserved for individual support. During third quarter of the 2020-2021 school year, students were transitioned to a hybrid learning model consisting of half-class, in-person learning alternating days for two days, followed by two days of synchronous, online learning with Friday reserved for individual support. The expectation for synchronous, online learning was that students log into Zoom and attend entire class periods as they would were they in the school building. Attendance was taken daily, and participation was noted.

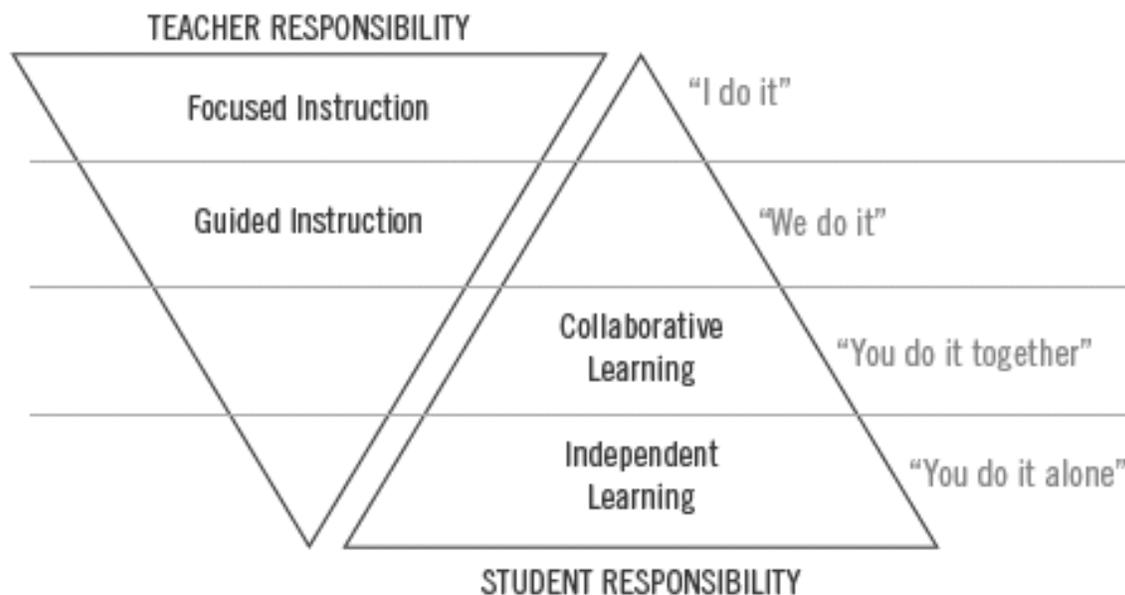
Several changes occurred in ninth-grade science class simultaneously with the beginning of the action research project intervention. The action research project lined up precisely with the beginning of the fourth quarter of the 2020-2021 school year. This was also the return to complete, full-class, in-person, five-days per week instruction for the entire middle school and high school. In the ninth-grade science class specifically, content shifted from introduction to chemistry to introduction to physics, per the Minnesota academic science standards. It is important to note that the content shift occurred later in this academic year compared to previous years due to COVID-19 disruptions.

The researcher has chosen to use the Gradual Release of Responsibility (GRR) Instructional Framework to present the introduction to physics portion of ninth grade science standards. The Gradual Release of Responsibility instructional method begins with teacher led direct instruction and over time, the learner undertakes more of the capacity for practicing or

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applying the content (Fisher & Frey 2013). For this action research project, the GRR framework being referenced is a four-pronged approach as outlined by Fisher & Frey 2013 in fig. 1.1 below:



In the Focused Instruction portion of the GRR model the teacher would introduce to the students the purpose of the lesson, relevance to their world, and content goals (Fisher & Frey, 2013). At the beginning of this action research project, the researcher introduced content of motion, speed, and acceleration to the ninth-grade class. The purpose of this unit is for students to understand the components of motion and how those components are used to calculate speed and acceleration. Motion is constant phenomenon of the natural world and there is an expectation that Minnesota high school students understand this to receive a high school diploma (Minnesota State Science Standards, 2009). The Focused Instruction portion of the lesson, sometimes referred to as the "I do it" portion (Fisher & Frey fig 1.1), included important vocabulary terms and the key concepts of the subject, including relevant equations for calculating speed and acceleration.

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Fisher & Frey, 2013 suggest that the Guided Instruction portion of the GRR is frequently used as a small group instructional method with those students identified as needing differentiated content or extra support. Throughout the action research project, the researcher implemented the Guided Instruction portion with the whole class, or a “We do it” time (Fisher & Frey fig 1.1), to solve numerous equation examples for practice. During this practice time the researcher would provide equation formulas and example problems to work through step-by-step with input from the students. At any time during Guided Instruction, the researcher may return to a Focused Instruction if reteaching of material is needed.

The Collaborative Learning portion of GRR no new content should be covered; this is time for students to work together, collaborate, with the material by applying it to some task or activity (Fisher & Frey 2013). In a science class, the laboratory portion of any unit naturally falls into the Collaborative Learning category. Students were given the task of choosing a physical activity to perform over a measured distance, for example walking backwards for fifty meters. Students worked in groups to measure the distance and to time each other doing the physical activities. Students later worked with their group members to apply the data they collected to the speed and acceleration equations they had been practicing during the Guided Instruction portion of the GRR learning method. During Collaborative Learning, participant groups may ask for teacher support, returning to the Guided Instruction portion. The small, lab groups would be considered a more traditional application of Guided Instruction compared to the initial use as describe in the previous paragraph.

The final component of the Gradual Release of Responsibility is Independent Learning on the part of the student or “You do it alone” (Fisher & Frey fig 1.1). At this point the learner

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has been working with content and information in a variety of ways, over time, with the support of their teacher and peers (Fisher & Frey, 2013). For this unit of content, the researcher assigned practice equations that students could begin during class time, study hall, or to complete as homework. During class time or study hall this Independent Learning may appear somewhat like Collaborative Learning, as the researcher does not prohibit small group work amongst the students. It is assumed that homework may be completed independently, however the researcher does not monitor study group activity that takes place outside of school hours.

Conclusion

The methodology for this action research project has considered the individuality of the distinctive subject, participants, researcher, and setting. The instructional framework being applied during this action research project is the Gradual Release of Responsibility (GRR) model whereby the teacher begins with Focused Instruction (“I do it”) to present key concepts before moving to a Guided Instruction (“We do it”) for demonstrating concept usage. Collaborative Learning (“You do it together”) during this action research takes the form of group lab activities which are followed by Independent Learning (“You do it alone”) as homework problems to practice everything that has been discussed throughout the unit (Fisher & Frey, 2013). Data collection tools have been developed by the researcher from examples found in the literature review and on the advice of expert colleagues within the school district.

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Results

Introduction

Data were collected to determine if teacher led tier two intervention increases student academic achievement. The results of the intervention have been compiled into three sections in order to address each of the three research questions: To what degree does small group, teacher attention effect ninth grade student science academic engagement? To what degree does small group, teacher attention effect ninth grade science students' academic performance? To what degree does small group, teacher attention effect ninth grade science students perceived self-efficacy?

Several data collection tools were used to assess students' academic engagement, academic performance, and self-efficacy. The tools used to collect data on these areas were: pre- and post- intervention student survey, an exit slip, teacher observation of participant engagement, comparing work completion and grades from previous grading periods, student performance self-assessment, goal setting activity, and selected individual interviews. Data collection tools are arranged and aligned to the research questions in a triangulation matrix as seen below in Table 1.

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Table 1

Triangulation Matrix

Research Questions	Data Tool A	Data Tool B	Data Tool C
Q1- To what degree does small group, teacher attention effect ninth grade student science academic engagement?	Pre- and post-student survey*	Exit slip, self-assessment of daily engagement	Teacher observation of engagement in class
Q2- To what degree does small group, teacher attention effect ninth grade science students' academic performance?	Comparing work completion quantity from previous quarters to current quarter	Comparing grades from previous quarters to current quarter	Student performance self-assessment
Q3- To what degree does small group, teacher attention effect ninth grade science students perceived self-efficacy?	Pre- and post-student survey*	Goal setting activity	Selected focus group of individual interviews

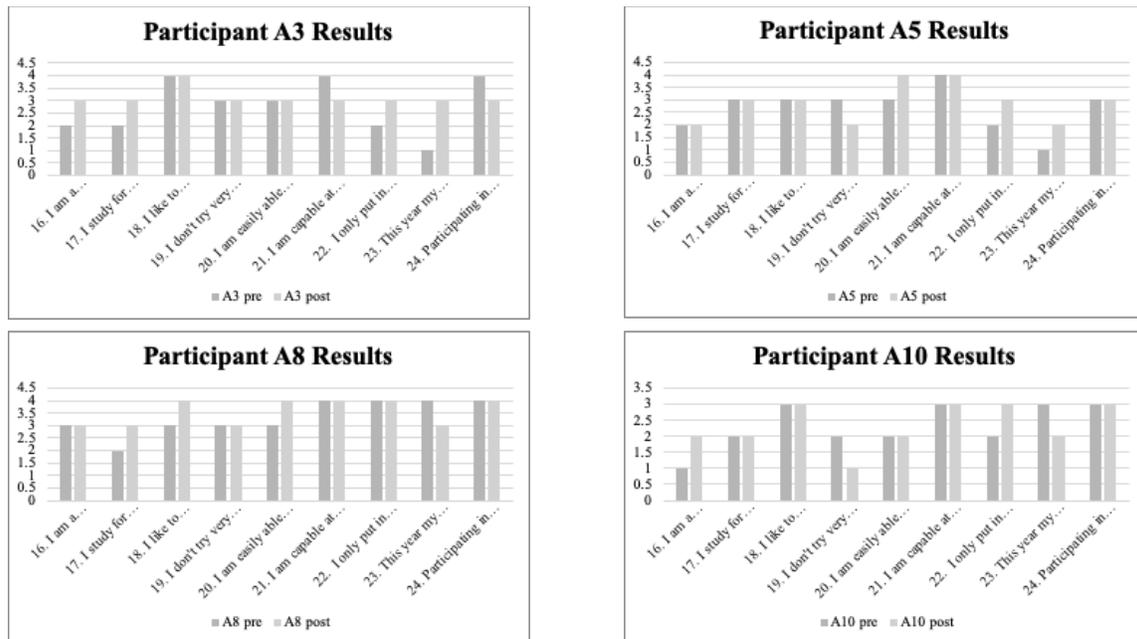
*Survey included items to address both research questions 1 and 3 as one document to preclude participant survey fatigue.

Data tool A for the first research question is a pre- and post- intervention participant survey consisting of nine questions taken from Risconscente's 2007 doctoral dissertation. Participant results were only included in this section if the participant completed both pre- and post-intervention surveys. Reportable results were only obtained from four of the ten participants; four participants did not complete one or both surveys. Two other participants with the same first name did not list a surname so pre- and post- intervention results were not able to be matched for comparison. See Appendix item 1 for participant academic engagement survey items.

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Figure 1

Pre- and Post- Intervention Participant Academic Engagement Survey Results



In answer to the research question, to what degree does small group, teacher attention effect ninth grade student science academic engagement, results from the participant survey show only a small degree of change between the pre- and post- intervention surveys. It is important to note that item #22 “I only put in my best effort when it's something I enjoy,” was answered as “agree” or “strongly agree” by all participants by the end of the intervention.

Participant A3 indicated no change in three survey items and improvement in two items. This participant was the only person whose believe in their ability to succeed at their classes decreased by the end of the intervention. This participant also showed a decrease in the importance of participating in their classes and changed their answer from disagree to agree for item #22 “I only put in my best effort when it's something I enjoy.”

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Participant A5 indicated no change in the five survey items and improvement in three items. Participant A5 changed their answer from disagree to agree for item #22 “I only put in my best effort when it's something I enjoy.”

Participant A8 indicated no change in the five survey items and improvement in three items. Participant A8 did not change their answer for item #22 “I only put in my best effort when it's something I enjoy,” however they rated it as “strongly agree” on both surveys. Participant A8 changed their response to item #23 “This year my school performance is equal or better than previous school years” from “strongly agree” to “agree.”

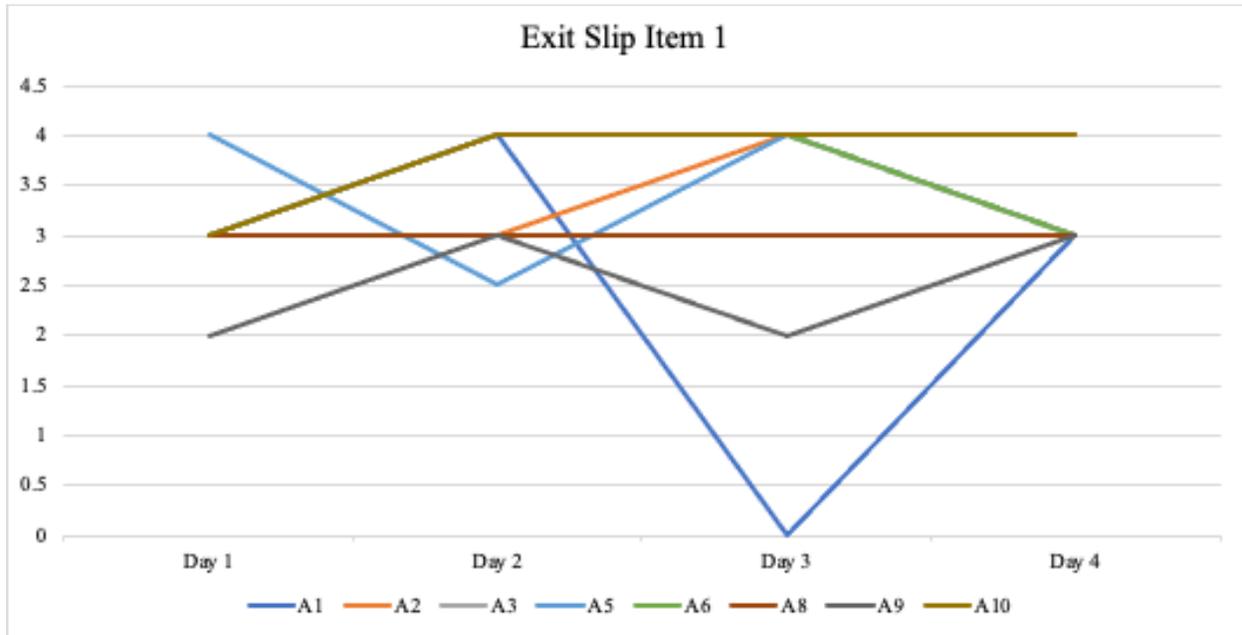
Participant A10 indicated no change in the five survey items and improvement in two items. Participant A10 changed their answer from disagree to agree for item #22 “I only put in my best effort when it's something I enjoy.” Participant A10 changed their response to item #23 “This year my school performance is equal or better than previous school years” from “agree” to “disagree.”

Data tool B for the first research question is an exit slip self-assessment of participant daily engagement. The exit slip self-assessment was distributed to the participants four times during the action research project. Participant results were only included in this section if the participant completed at least three out of the four exit slips. The exit slip consisted of three items for participants to respond to: On a scale of 1-4 (1 worst, 4 best), how well did you engage in your science education today? What was your best success in science class today? What is the biggest thing you would like to improve upon for next time? See Appendix item 2 for participant exit slip.

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Figure 2

Exit Slip Item 1 Results



Item #1 of the exit slip showed that of the eight participants who completed three or more exit slips, all ranked themselves highly in terms of how well they felt they engaged in science class on the days in question. Item #2 of the exit slip asked participants what their best success was for the days in question. Answers to this question fell consistently into three broad categories, taking notes, participating, and completing work. Item #3 of the exit slip asked participants what was the biggest thing that they would like to improve upon for next time. Answers to this question fell consistently into just two broad categories, taking more or better notes and participating more.

Data tool C for the first research question is the researcher's observation of participant academic engagement. Observational data was entered onto a class roster check list. Participant

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A7 has been eliminated from the data table due to absence from school for all the dates of the observational period.

Table 2

Researcher Observation of Participant Academic Engagement

	A1	A2	A3	A4	A5	A6	A8	A9	A10
4-6	X	X	X	A	X	0	X	X	+
4-7	X	X	X	A	X	X	X	X	+
4-8	0	0	X	0	-	0	X	X	+
4-12	X	X	A	0	X	X	-	X	+
4-13	X	-	+	-	-	X	+	+	+
4-15	+	+	+	A	+	+	-	+	+
4-16	+	+	+	A	+	+	+	+	+
4-22	X	X	0	+	-	0	+	X	+
4-23	X	X	X	X	0	X	0	X	+

- Plus sign (+) for positive, on-topic engagement, of an amount greater than was typical for that participant
- Capital letter (X) for positive, on-topic engagement, of an amount typical for that participant
- Minus sign (-) for negative, off-topic engagement, or disruption to class
- Zero (0), for non-engagement, or significantly less than was typical for that participant
- Capital letter (A) for participant absent on that day

Of the nine dates that the researcher recorded observational data of participant academic engagement, every participant demonstrated at least one day of positive, on-topic engagement, of an amount greater than or typical for that participant. During the collaborative, lab activity days

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positive academic engagement increased, however there was no significant decrease in academic engagement during focused instructional days.

The data tools for research question two are attempting to determine to what degree the intervention affects participant academic performance. Data tool A for the second research question is a comparison of percentages of student missing work from the first three grading periods compared to student missing work during the time of the intervention, mid-term of quarter four. An additional data point of missing work from the end of quarter four has also been included for comparison.

Table 3

Participant Percent Missing Work

	Q1	Q2	Q3	Q4-mid	Q4-final
A1	94.4%	100%	78.6%	25%	39%
A2	50.0%	39%	21.4%	0%	16.7%
A3	27.7%	70%	0%	12.5%	11%
A4	61.1%	91%	57%	75%	66.7%
A5	5.5%	8.7%	42.9%	0%	22.2%
A6	77.8%	74%	64.3%	50%	61.1%
A7	88.9%	100%	93.0%	87.5%	94.4%
A8	0%	4.3%	7%	0%	0%
A9	16.7%	8.7%	7%	0%	0%
A10	22.2%	56.5%	28.6%	0%	33.3%

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There is a significant decrease in the percentage of missing work from all participants during the time of the intervention, excluding the two students, A4 and A7, whose attendance continued to be poor during fourth quarter.

Data tool B for the second research question is a comparison of student grades from the first three grading periods compared to student grades during the time of the intervention, mid-term of quarter four. An additional data point of the final grade from the end of quarter four has also been included for comparison.

Table 5

Participant Grade Percentages

	Q1	Q2	Q3	Q4-mid	Q4-final
A1	6%	0%	18%	54%	60%
A2	33%	38%	64%	53%	53%
A3	57%	18%	68%	58%	60%
A4	25%	2%	26%	17%	28%
A5	70%	74%	54%	70%	76%
A6	28%	21%	25%	15%	28%
A7	24%	0%	9%	14%	10%
A8	82%	76%	78%	93%	92%
A9	66%	66%	63%	75%	72%
A10	75%	36%	63%	43%	60%
Percent of students passing	40%	30%	50%	30%	60%

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The grading scale used by the school district for high school students is a 90-80-70-60, A-B-C-D, grading scale where 60% is a D- and is the lowest percentage possible to pass a class and earn credit towards graduation. Of the ten participants, only four showed a significant difference in grade percentage at mid-term of fourth quarter compared to previous grading periods.

Data tool C for the second research question is a participant self-assessment of their performance for tracking their own completed work and grades as posted in Infinite Campus. This data tool, if used correctly should not yield results different from the two quantitative data tools described by the researcher in figures 4 and 5. Upon reviewing the participants' self-assessment worksheets, the research found that participant A4 and A7 were not in attendance the day the assessments were completed. Of the remaining eight participants only two of the participants accurately responded to question 1, while two of the participants refused to answer the question. The researcher also found that seven of the eight participant self-assessments, all of whom earned 68% or less for their third quarter grade had at least one or more D or F grades in their other ninth grade classes for the third quarter grading period. See Appendix item 3 for participant performance self-assessment activity.

The data tools for research question three are attempting to determine to what degree the intervention affects participant self-efficacy or motivation. The planned data tools for answering this question included pre- and post- intervention participant self-efficacy survey and a participant goal setting activity. The researcher had also planned to interview select participants for a focus group to get a better understanding of participant perception of self-efficacy. All participation in the action research was completely voluntary, no participants were willing to

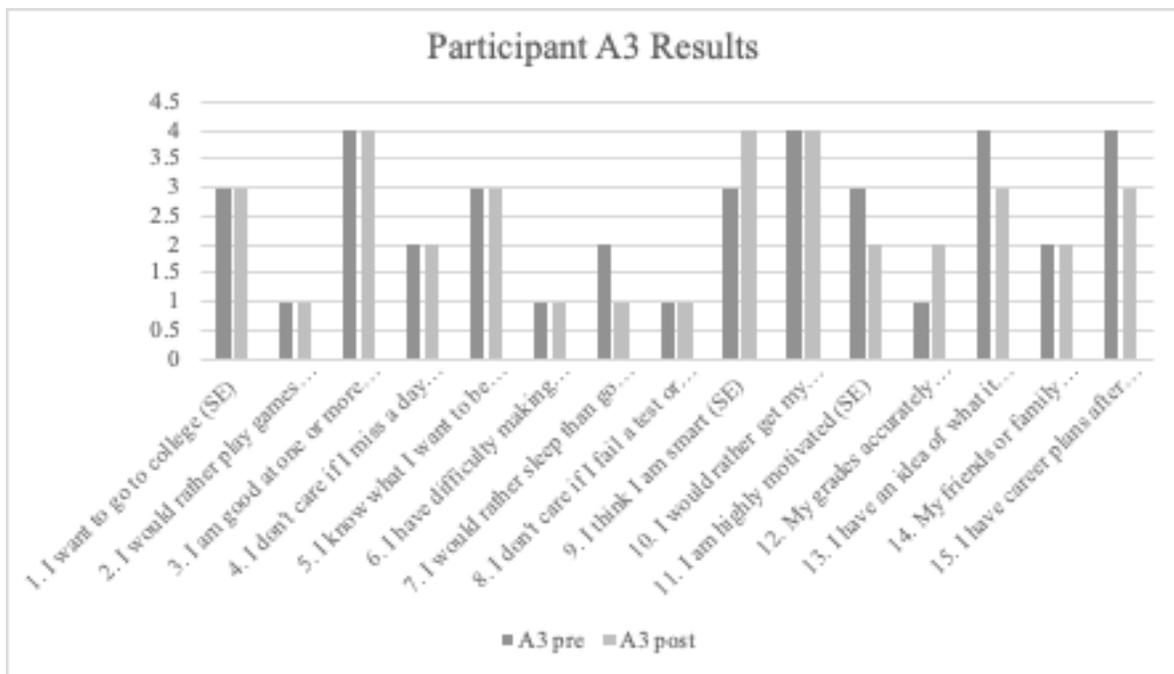
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participate in individual interviews with the researcher, so no data is available for data tool C for the third research question.

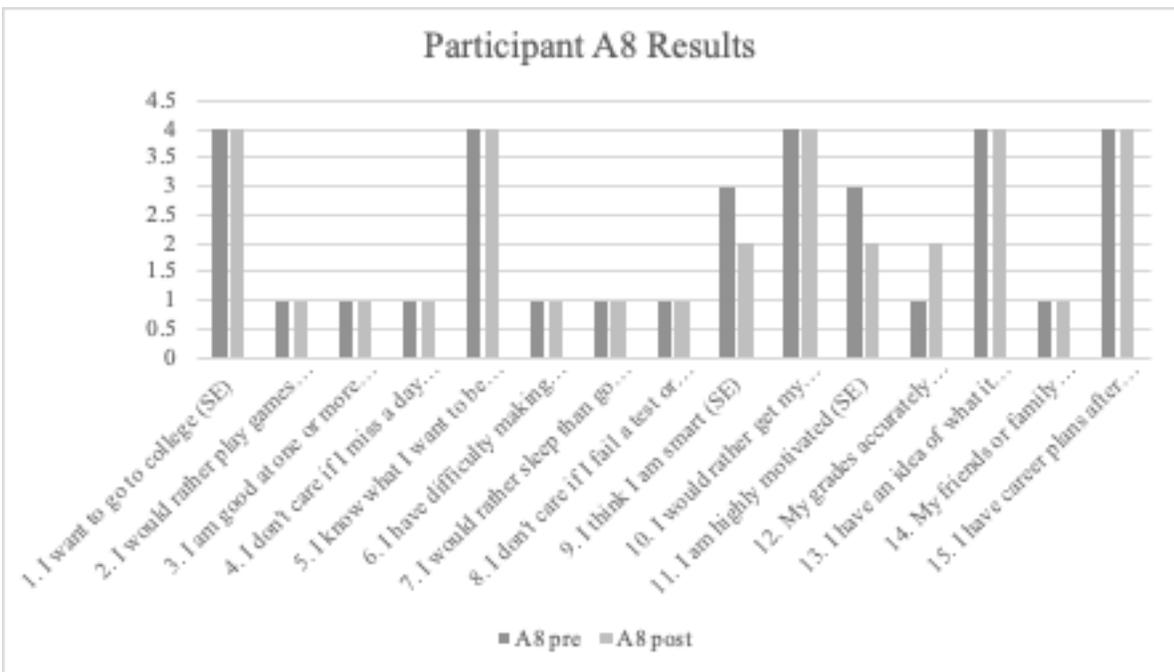
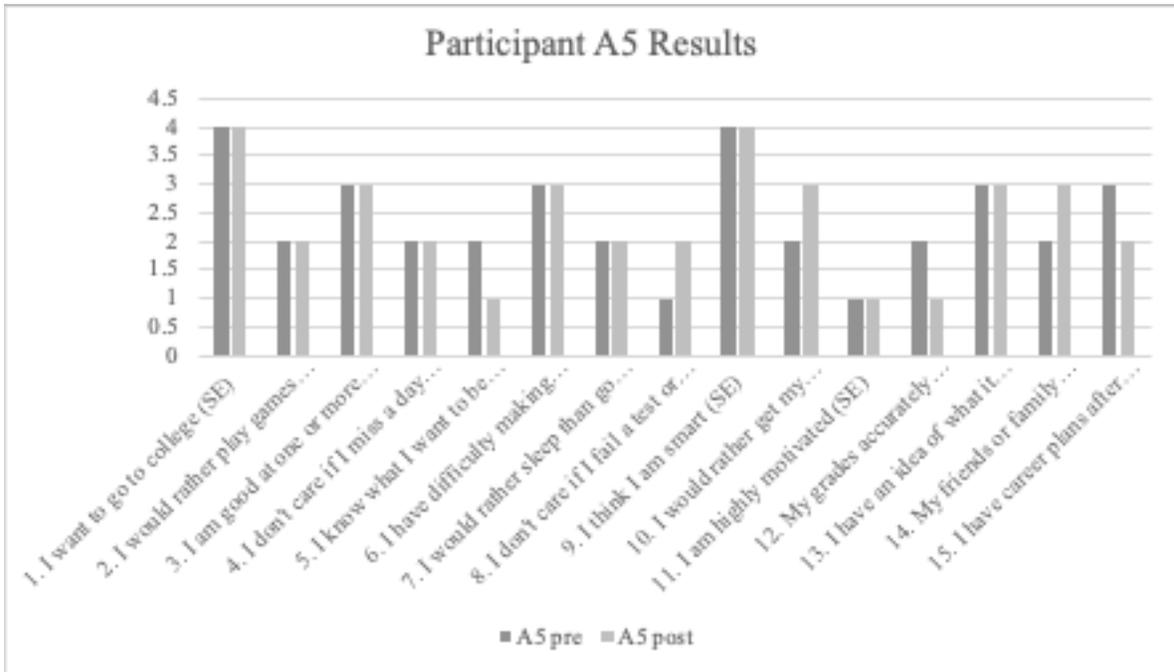
Data tool A for the third research question is a pre- and post- intervention participant survey consisting of fifteen questions taken from Risconscente’s 2007 doctoral dissertation. Participant results were only included in this section if the participant completed both pre- and post- intervention surveys. Reportable results were only obtained from four of the ten participants; four participants did not complete one or both surveys. Two other participants with the same first name did not list a surname so pre- and post- intervention results were not able to be matched for comparison. See Appendix item 4 for participant academic engagement survey items.

Figure 3

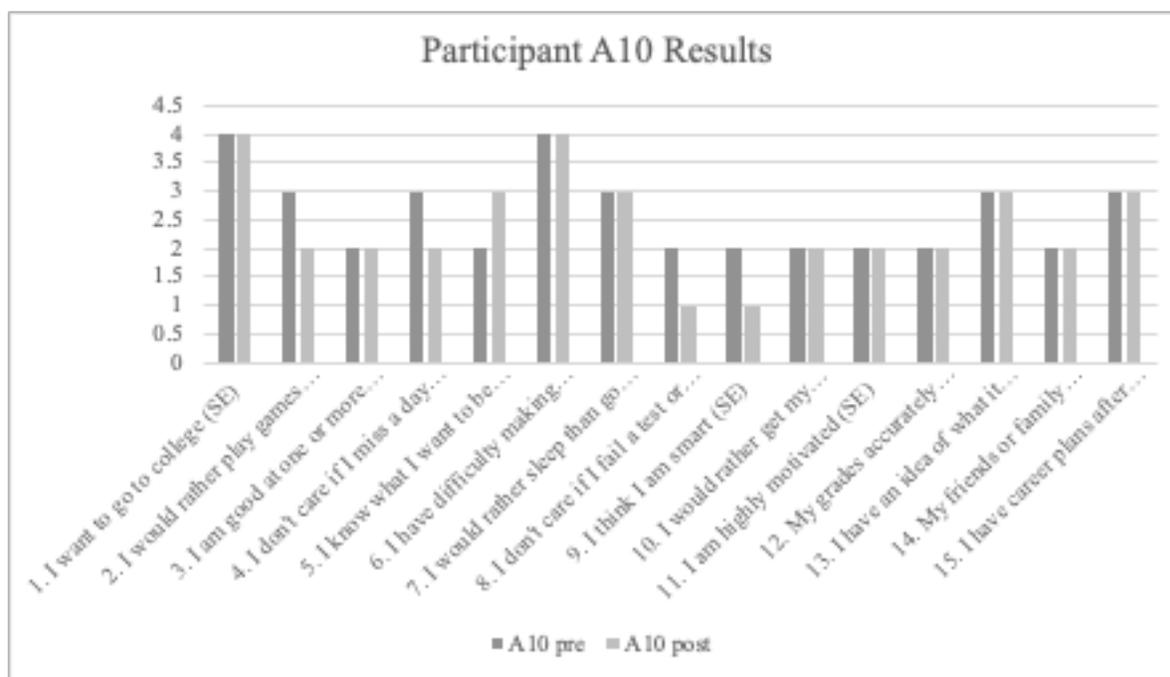
Pre- and Post- Intervention Participant Self-Efficacy Survey Results



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Results from the participant self-efficacy survey overall show less change between pre-intervention and post- intervention than did the student academic engagement survey. The participants generally indicated that they consider themselves to be motivated people who have post high school plans for career or continued education. All of the participants indicated that they do care if they miss a day of school and that they put their responsibilities ahead of leisure activities most of the time.

Data tool B for the third research question was a goal setting activity that asks participants to choose three specific goals to serve as a starting point of awareness of their self-efficacy and how it pertains to academic performance and engagement during the period of intervention in science class. Participants were given a list of eight goals to choose from directly or to modify, or they were allowed to come up with their own goals. See Appendix item 5 for participant goal setting activity.

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Figure 4

Participant Goal Setting Distribution

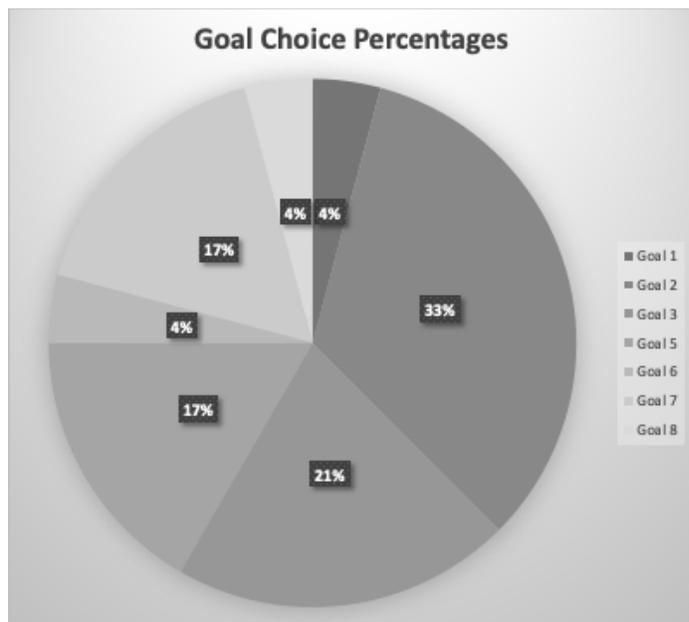


Figure 7 shows the distribution of goals that were chosen by the participants. Participant A4 and A7 were not in attendance the day of the goal setting activity and did not complete the activity. Though it is not evident from the pie chart above, of the eight participants who did complete the goal setting activity, all eight chose goal #2 “I will complete at least (some %) of all homework/lab activities on time.” Additionally, none of the eight participants choose goal #4 “Each week I will raise my hand at least (some number) of times to ask or answer a question.” The next most chosen goal, five out of eight participants picked goal #3 “I will score at least (some %) or better on chapter tests or final projects,” while half of all the participants chose goals #5 and #7 as areas to focus on during the period of the intervention.

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Conclusion

Introduction

The purpose of this action research project was to determine to what degree, if any, tier two teacher led interventions had on student academic achievement. Research questions were used to focus the action research project into three topics: 1) To what degree does small group, teacher attention affect ninth grade student science academic engagement? 2) To what degree does small group, teacher attention affect ninth grade science students' academic performance? and 3) To what degree does small group, teacher attention affect ninth grade science students perceived self-efficacy?

Discussion

Results show an inconclusive connection between the tier two teacher led intervention and student academic achievement. This is possibly due to a variety of circumstances created by the COVID-19 pandemic which interfered with multiple aspects of student academic achievement. Several changes occurred in ninth-grade science class simultaneously with the beginning of the action research project intervention. The action research project lined up precisely with the beginning of the fourth quarter of the 2020-2021 school year. This was also the return to complete, full-class, in-person, five-days per week instruction for the entire middle school and high school.

The researcher deliberately chose an intervention that would be possible to implement regardless of in-person or distance learning methods, however, the researcher did not consider that the change from distance learning to in-person learning would present a variable that would interfere with gathering participant academic engagement data as it was affected by the

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intervention. The researcher was unable to determine if the tier two teacher led intervention increased participant academic engagement or if returning to school in-person full-time after distance learning from March 2020 to April 2021 due to COVID-19 had more effect on student academic engagement in the classroom. The research did confirm via observation that hands-on, collaborative learning activities yield greater participant academic engagement than do other instructional methods.

Upon returning to in-person instruction the classroom teacher had more direct influence on student use of time for work completion. The researcher was therefore unable to determine if the tier two teacher led intervention increased participant work completion and improved student quarter grades or if returning to in-person learning full-time had more effect on participant work completion and improved grades. During distance learning the percent of student work completion was low (see Fig 4). A positive relationship between participant work completion and improved grades was found, regardless of the reason for the increase in percent of participant work completion. Participants who completed more schoolwork ultimately had better grades when compared with their previous grading periods.

Participant self-efficacy is inherently a difficult item to measure and relies heavily on participant self-reporting. Self-assessment surveys were only collected from four of the ten participants and showed no significant difference in reported results between pre- and post-intervention implementation. Participants also completed a goal setting activity which indicated motivation on their part to improve select aspects of their academic performance in science class for the fourth quarter grading period. All eight of the responding participants indicated that improving their daily work and homework completion percentages was the most important thing

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that they would focus on over the course of the intervention. It is important to note that upon reviewing the goal setting data after the completion of the intervention, the researcher should have planned an additional post- intervention activity to ask the participants what steps they took to achieve their goals and if they had accomplished the task of meeting those goals.

Conclusion

In conclusion, the process of this action research project has drawn attention to areas of improvement for the researcher in terms of intervention implementation and data collection. Future action research should take greater care in the development of data collection tools to align to the research questions more concisely. Additionally, an intervention period of six to eight weeks should also be considered best practice for data collection in intervention fidelity. Finally, further research should be conducted under non-pandemic conditions to eliminate unpredictable variables in learning environments.

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Author's Note

The researcher would also like to note as a point of information that one week after the completion of the intervention the ninth-grade science class were all required to return to distance learning for a two-week quarantine period due to COVID-19 exposure in the class. Although not included in this action research paper and supported only by researcher observation, participant work completion and academic engagement immediately decreased to pre- intervention levels during the quarantine period. Upon returning to in-person learning following the quarantine, the researcher observed a resurgence in participant work completion and a greater percentage of ninth-grade students were able to pass fourth quarter than previous grading periods.

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Item 3: Q2 Data Tool C Participant Missing Work and Grade Analysis

Name:

Date:

3rd Quarter missing work and grade analysis: (12 assignments/participation activities, 2 tests, 15 extra credit points possible)

1. How many zeros/missing assignments did you have during 3rd quarter?

2. How many assignments did you fail during 3rd quarter?

3. How many tests did you fail during 3rd quarter?

4. What were your overall 3rd quarter grades and percentages for all classes?
 - a. Science:
 - b. Civics:
 - c. Algebra:
 - d. Language Arts:
 - e. Phy| Ed/Health:

Item 4: Q3 Data Tool A - Student Efficacy Pre- and Post- Survey

Likert scale 1-4 (1- strongly disagree, 2 -disagree, 3 - agree, 4 - strongly agree)

Student Efficacy (SE) Survey Questions

1. I want to go to college/vocational school (post high school formal education) (SE)
2. I would rather play games than attend to my responsibilities (SE)
3. I am good at one or more sports (SE)
4. I don't care if I miss a day of school or class (SE)
5. I know what I want to be when I grow up (SE)
6. I have difficulty making decisions (SE)
7. I would rather sleep than go out with my friends (SE)
8. I don't care if I fail a test or a class (SE)
9. I think I am smart (SE)
10. I would rather get my work done first, then do activities I enjoy (SE)
11. I am highly motivated (SE)
12. My grades accurately show my ability level in school (SE)
13. I have an idea of what it takes to live independently from my parents/guardians (SE)
14. My friends or family would describe me as selfish or self-centered (SE)
15. I have career plans after graduation (SE)

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Item 5: Q3 Data Tool B Participant 4th Quarter Goal Setting

Name:

Date:

4th Quarter Science Goal Setting:

I want you to have three clear, specific goals for science class academic engagement/academic performance. You may choose from the examples below, you may modify the examples below, or you can come up with your own goal.

Goal 1: I will have on topic, positive participation in discussions and answering questions at least once per class period.

Goal 2: I will complete at least (some %) of all homework/lab activities on time.

Goal 3: I will score at least (some %) or better on chapter tests or final projects.

Goal 4: Each week I will raise my hand at least (some number) of times to ask or answer a question.

Goal 5: I will come to class prepared (with all my items: iPad, pencil/pen, notebook) and on time at least (some %) of the week.

Goal 6: I will try a new study system during 4th quarter to help improve my test scores.

Goal 7: I will check my Infinite Campus grade at least once per (choose a time period) to better keep track of my grades and work completion.

Goal 8: I will try one new motivational strategy to help me focus on completing the work I need to accomplish during 4th quarter.