THE EFFECT OF INTEGRATED, CROSS-CURRICULAR CO-TEACHING ON STUDENT ACHIEVEMENT, ENGAGEMENT, AND HIGH SCHOOL COMPLETION AT AN ALTERNATIVE HIGH SCHOOL

by

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ABSTRACT

This study examined the effect a cross-curricular, team-taught course had on student achievement and high school completion at an Alternative High School. Additional sub-questions included what was the effect on a student's engagement in coursework, what was the effect on student attendance, and what was the effect on a student's attitude towards school? Engagement, attendance, credit earned, attitude survey and interview data were used to identify this impact. Students from integrated courses were compared to courses that taught the same science content in a traditional classroom. Engagement, attendance, credit earning, and attitude experienced significant increases in the treatment group over the study period when compared to the control group. The study supports offering students course experiences that are integrated, co-taught, and project-based. The study showed this had a positive impact on engagement, student attendance, and attitude leading to improved course completion, outcomes for graduation and future success. This approach has significant implications in the alternative school setting where students are often at a deficit in credit earning in relationship to their age. In this scenario, opportunities for credit recovery and accelerated learning increase the likelihood of students completing high school.

INTRODUCTION AND BACKGROUND

This is my 14th year teaching at METRO High School in Cedar Rapids, Iowa. Cedar Rapids is a blue-collar industry-focused city in the creative corridor of eastern Iowa. Rockwell Collins, ADM, Cargill, and Quaker Oats are just a few of the large corporations employing residents. In addition, an innovative and creative mix of entrepreneurs and small businesses strengthen the city's business sector. Art and culture flourish in Cedar Rapids, with the NewBo District and the Czech Village being areas of cultural focus.

METRO is the alternative high school for the Cedar Rapids Community School District (CRCSD), a diverse and changing school district. Over the past decade the district has seen its average student become less affluent and more culturally diverse. The district's new focus is on making "every student future ready." This vision is outlined in the districts strategic plan (CRCSD, 2017). METRO serves a population of roughly 400 at-risk students. METRO's philosophy focuses on the students. Compared to the traditional high schools in the district, we provide smaller classroom size, co-teaching, an advisory system, and a focus on building relationships and getting students out into their community. This approach helps support students individualized needs and bring relevance to our students' educational experience.

The students at our alternative high school have been identified as being at-risk of not completing high school and face many challenges. Often, these challenges make school and their education a lower priority in their lives. This drives METRO's mission and namesake, Mastering Educational Tasks Regardless of Obstacles (METRO). To do

this we must focus on engaging students and bringing relevance into our students' educations as well as helping them progress through the process of high school graduation and the preparation needed to ready them for their next steps. In an alternative setting, this often involves credit recovery, innovative and engaging programs, strong social and emotional support, and individualized learning strategies.

At METRO, we have a large diversity in our teachers, pedagogical approaches, curriculum development, programs, and counseling which leads to providing innovative, engaging, individualized "alternatives" to traditional education. Unfortunately, many of our building systems; schedule, courses, assessment, and graduation completion are forced to exist inside a conventional educational framework. As a teacher, I am limited in what effect I can have to make change to this system. As an alternative educator, I have been both empowered and emboldened to enact change for the benefit of our students.

One way to approach change is through curriculum integration and individualized, competency-based courses. This style of course combines the teachers and curriculum of two separate content areas and allows them to merge two courses together. Curriculum integration involves aligning standards and benchmarks, connecting content from the two courses, and generating projects and learning opportunities that engage students in integrated learning. Competency-based education (CBE) is defined by the CBE Network as "an academic model in which the time it takes to demonstrate competencies varies and the expectations about learning are held constant" (Competency-Based Education Network, 2018). CBE was the model used to implement our integrated course.

There are many reasons why combining two courses together can be a positive experience. Students benefit from the opportunity to see the interconnectedness of the world. Students are given opportunities to see how math and science, or language and social science interact in the real world. In addition, students may be able to progress more quickly through graduation requirements with courses becoming more efficient and less time-bound.

But will this approach lead to increased student achievement? This led to the creation of my focus statement, what effect would a cross-curricular, team-taught course have on student achievement and high school completion at an Alternative High School? In addition, the following sub-questions were proposed.

1. What is the effect on a student's engagement in coursework?
2. What is the effect on student attendance?
3. What is the effect on a student's attitude towards school?

CONCEPTUAL FRAMEWORK

The landscape of education in the 21st century is changing. In our technology-rich global economy, the success of our students lies in their ability to be flexible and adapt to an ever-changing workforce (Winthrop & McGivney, 2016). The educational system that promoted one-size fits all learning and factory-style schools is being challenged. As we work to align educational reform to the needs of current business and industry, it has become essential for students to have strong social and humanistic skills that cannot be replaced with technology and innovation. These skills, summarized as "the Four Cs", include critical thinking skills, communication skills, collaboration, and creativity

(Partnership for 21st Century Learning, 2016). The Four Cs have been shown to improve in students that are engaged in interdisciplinary or integrated curriculum (Loepp, 1999).

Students have been found to increase their engagement, problem solving, critical thinking skills, motivation and achievement when engaged in integrated or cross-curricular teaching and learning (Costley, 2015). Cross-curricular teaching and learning is a successful strategy thanks to its focus on integrating multiple disciplines, lending itself to a classroom that is more student-centered, focused on skill development and incorporating the whole school, community and culture while better preparing students for the workforce and their future (Byrne & Brodie, 2012). Cross-curricular connections help students understand and navigate the world we live in by providing the skills to make sense of it all. At the same time, engaging students in this way also promotes learning and teaches students the skills they need to learn (Jeya, Harish, Kumar, & Raja, 2012).

There is a lack of research and case-studies involving integrated or interdisciplinary curriculum at the secondary level. These types of strategies are more predominantly found in elementary settings. Secondary classrooms are still very much structured into rigid disciplines and courses (Loepp, 1999). Research in alternative education is even more sparse, with no publications found linking interdisciplinary instruction with success in the alternative school settings. However, along with a strong teacher relationship, there is a link to success in alternative schools when implementing a personalized learning approach (Farrelly & Daniels, 2014). This study will contribute to growth in these research areas.

A potential strength of an integrated interdisciplinary approach at the secondary level in the alternative school setting is its allowance for competency-based assessment measures rather than traditional seat time. This means that students demonstrating standards in multiple disciplines would not be subjected to traditional constraints on time, place, schedule, and grading. A potential hurdle for teachers and school districts when using a competency-based approach is accountability. Most state and local accountability systems are fixed and don't allow for this innovative approach. There is evidence that when done with fidelity, competency-based assessment can help those students who have been historically marginalized and who are most at-risk of not completing high school (Patrick & Sturgis, 2013). In Iowa, work has been underway to lay out a pathway to remove obstacles, so teachers and school districts know what the state expects when implementing competency-based pathways (Iowa Department of Education, 2012).

When combined with competency-based education, personalized learning provides students with flexible learning environments to meet their needs, growth-minded feedback so they know where they are and where they are going, as well as opportunities to explore college and career pathways. When combined with a blended learning approach, personalized learning and competency-based assessment become highly effective, efficient, and scalable, leading to increased benefits for marginalized and at-risk students (Hyslop & Mead, 2015). These principles were combined to provide the framework for integrated courses and served to guide this work.

METHODOLOGY

The classroom research was conducted over a nine-week period during the fourth quarter of the 2018-2019 academic school year. This time period was selected due to its lack of extended breaks during that time. It was originally planned for the third quarter but our active winter led to record snow delays and cancelations. It was decided that this variability in students' school schedule could skew results. This time of the school year is also our most challenging with historically the lowest attendance, engagement, and credit earning of the school year.

Study Population

Two courses were selected for the study, physical science and Earth science. These courses were chosen as they had been piloted as integrated, co-taught courses in past semesters and there were methods and strategies in place for the integration of curriculum. Each course had a control section taught by a science teacher through a typical approach in our alternative school setting. The treatment section of the course was taught with a co-teaching approach, integrating content and standards from science as well as another academic content area.

The research methodology for this project received an exemption by Montana State University's Institutional Review Board and compliance for working with human subjects was maintained (Appendix A). Students in both the control (*N=36*) and treatment (*N=45*) sections were registered in these sections following our typical registration process which is completed with the student and their advisor. Students were not selected or directed to register in one section or the other. Information about the

nature of the different sections was shared with advisors and the students as they built the students' schedules.

Description of the Treatment

The section of integrated physical science was co-taught with a Career and Technical Education (CTE) teacher. Students were dual enrolled in physical science and robotics and automation. The section of integrated earth science was co-taught with a social studies teacher. Students were dual enrolled in earth science and U.S. history. Students in both groups had the opportunity to earn credit in both courses during the semester (two total credits).

Both sections had been designed, aligned, and planned to use a co-teaching method that included integrating standards, concepts, projects, and themes. Students in the treatment groups experienced a course that incorporated content specific seminar series during which students divided between the two content areas to receive specific and targeted direct instruction. Additionally, treatment students experienced project units that integrated content from the two disciplines into thematic units that resulted in a unit product that demonstrated learning from each discipline. Assessment was aligned to standards and used proficiency scales to assess students understanding of the content and drive instruction.

Both sections of the earth science course (treatment and control group) targeted content standards in natural resources and Earth history. The big ideas and standards targeted remained the same for both the traditional control section and the integrated

treatment section. Only the delivery of this content was altered. Similarly, both sections of the physical science course targeted content standards in force and motion.

Data Collection Instruments

A variety of data collection instruments were used to better understand the impact the treatment had related to the studies research questions. The triangulation matrix below (Table 1) outlines these data collection instruments and how they aligned with the research questions. The data collection instruments generated multiple lines of evidence ensuring each question was well represented.

Table 1
Triangulation Matrix

Research Questions	Data Sources 1	2	3
What effect would a cross-curricular, team-taught course at an Alternative High School have on…			
Engagement	Instructional Practices Inventory (IPI) Engagement Data	Student Attitude Survey (Likert Style)	Student Interviews
Student Attendance	Student Attendance Data	Credit Earning Data	Student Attitude Survey (Likert Style)
Student's attitude toward school	Student Attitude Survey (Likert Style)	Instructional Practices Inventory (IPI) Engagement Data	Student Interviews
Student achievement & high school completion	Credit Earning Data	Student Attendance Data	Student Attitude Survey (Likert Style) & Student Interviews

To compare student engagement across the four sections, Instructional Practices Inventory (IPI) data collection methods were utilized (Appendix B). A trained IPI data collector gathered engagement data in each of the study sections over the course of the

research period. During each data collection, the data collector evaluated the engagement of the student majority in the classroom to determine the level of engagement being predominately displayed in the classroom at that time. The IPI scale is comprised of six categories (Table 2). IPI data were analyzed for trends and patterns between the control and treatment group. Baseline school-wide data was used to identify how the control and treatment varied from the norm.

Table 2

Instructional Practices Inventory Categories.

Student Active Engaged Learning (6)	Students are engaged in higher order thinking & developing deeper understanding through analysis, problem solving, critical thinking, creativity, and/or synthesis. Engagement in learning is not driven by verbal interaction with peers, even in a group setting. Examples of classroom practices commonly associated with higher order/deeper Active Engaged Learning include - inquiry-based approaches such as project-based and problem-based learning, research and discovery/exploratory learning, authentic demonstrations, independent metacognition, reflective journaling, and self-assessment, and higher order responses to higher order questions.	Student Engagement in Higher-Order Deeper Learning
Student Verbal Learning Conversations (5)	Students are engaged in higher order thinking and developing deeper understanding through analysis, problem solving, critical thinking, creativity, and/or synthesis. The higher order/deeper thinking is driven by peer verbal interaction. Examples of classroom practices commonly associated with higher order/deeper Verbal Learning Conversations include – collaborative or cooperative learning, Socratic learning, small group or whole class analysis and problem solving, metacognition, reflective journaling, and self-assessment. Conversations may be teacher stimulated but are not teacher dominated.	
Teacher-Led Instruction (4)	Students are attentive to teacher-led instruction as the teacher leads the learning experience by disseminating the appropriate content knowledge and/or directions for learning. The teacher provides basic content explanations, tells or explains new information or skills, and verbally directs the learning. Examples of classroom practices commonly associated with Teacher-Led Instruction include – teacher dominated question/answer, teacher lecture or verbal explanations, teacher direction giving, and teacher demonstrations. Discussions may occur, but instruction and ideas come primarily from the teacher. Student higher order/deeper learning is not evident.	Student Engagement in Knowledge & Skill Development
Student Work with Teacher Engaged (3)	Students are engaged in independent or group work designed to build basic understanding, new knowledge, and/or pertinent skills. Examples of classroom practices commonly associated with Student Work with Teacher Engaged include – basic fact finding, building skill or understanding through practice, "seatwork" worksheets, chapter review questions, and multi-media with teacher viewing media with students. The teacher is attentive to, engaged with, or supportive of the students. Student higher order/deeper learning is not evident.	
Student Work with Teacher not Engaged (2)	This category is the same as category 3 except the teacher is not attentive to, engaged with, or supportive of the students. The teacher may be out of the room, working at the computer, grading papers, or in some form engaged in work not directly associated with the students' learning. Student higher order/deeper learning is not evident.	
Student Disengagement (1)	Students are not engaged in learning directly related to the curriculum.	Not Engaged

Remember: IPI coding is not based on the type of activity in which the student is engaged, but rather how the student is engaging cognitively in the activity. Examples provided above are only examples often associated with that category. The Instructional Practices Inventory categories were developed by Bryan Painter and Jerry Valentine in 1996. Valentine refined the descriptions of the categories (2002, 2005, 2007, and 2010) in an effort to more effectively communicate their meaning. The IPI was developed to profile school-wide student engaged learning and was not designed for, nor should it be used for, personnel evaluation (Valentine, 2012).

To collect data on students' attitude, all sections were given the Student Attitude Survey (Appendix C). This survey collected student attitudes towards school, graduation, credit, attendance, and learning. In this survey a Likert style scale was used (Table 3).

Table 3
Student Attitude Survey Scale

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5	4	3	2	1

Results from the survey were analyzed using a Pearson's Chi-squared test. This data along with IPI and student interview data were used to compare student attitude across the treatment and control groups.

To understand the impact the treatment had on student achievement, course completion, and high school graduation, student attendance and credit earning data was collected from the School's Information System, PowerSchool. This data was used to determine the effect the treatment had on attendance and credit earning during the research study. This data was analyzed using t-tests to determine the statistical significance of any change in attendance or credit earning between the groups.

Finally, interviews were conducted with students following the treatment to find out the potential causes of any change measured by the other data collection instruments. The interview questions (Appendix E) probed students around their thoughts on attendance, learning, engagement, and attitude. The interview results were analyzed for patterns and themes to support or reject other findings in the research study.

DATA AND ANALYSIS

A wide array of data collection methods was used during the study period, allowing for multiple data sets to be compared across the control and treatment group. Engagement, credit earning, attendance, student attitude, and student interview data have provided a snapshot but must be looked at individually and then triangulated to identify trends among the data collection methods.

Engagement: IPI Data

Engagement data collected from the classroom was converted to a percent for each category (Table 4). In addition to the data from the treatment and control groups, school wide IPI data was used to identify trends in the control and treatment groups away from the established school norms.

Table 4
IPI Categorical Data

	Treatment		Control		School-wide	
IPI Categories	# Obs.	Percent	# Obs.	Percent	Spring 2019	School Average
(6) Student Active Engaged Learning	3	13.0%	0	0.00%	14.4%	11.2%
(5) Student Learning Conversations	6	26.1%	2	8.70%	2.5%	5.5%
(4) Teacher-Led Instruction	5	21.7%	8	34.78%	22.3%	25.7%
(3) Student Work w/ Teacher Engaged	4	17.4%	4	17.39%	27.0%	35.2%
(2) Student Work w/ Teacher not Engaged	2	8.7%	2	8.70%	14.0%	8.2%
(1) Complete Disengagement	3	13.0%	7	30.43%	19.8%	14.2%
Total Samples	23		23			
(5/6) Higher-Order Deeper Learning	9	39.1%	2	8.70%	16.9%	16.7%

(2/3/4) Knowledge and Skill Development	11	47.8%	14	60.87%	63.3%	69.1%
(1) Complete Disengagement	3	13.0%	7	30.43%	19.8%	14.2%

The control group showed an increase of 10.6% in complete disengagement from the spring 2019 and an increase of 16.2% from the school average. In contrast the treatment group experienced a decrease of 6.8% in complete disengagement from the spring 2019 and a decrease of 1.2% from the school average. The control group showed a decrease of 8.2% in higher-order deeper learning (5/6) from the spring 2019 and a decrease of 8% from the school average. In contrast the treatment group experienced an increase of 22.2% in higher-order deeper learning (5/6) from the spring 2019 and an increase of 22.4% from the school average.

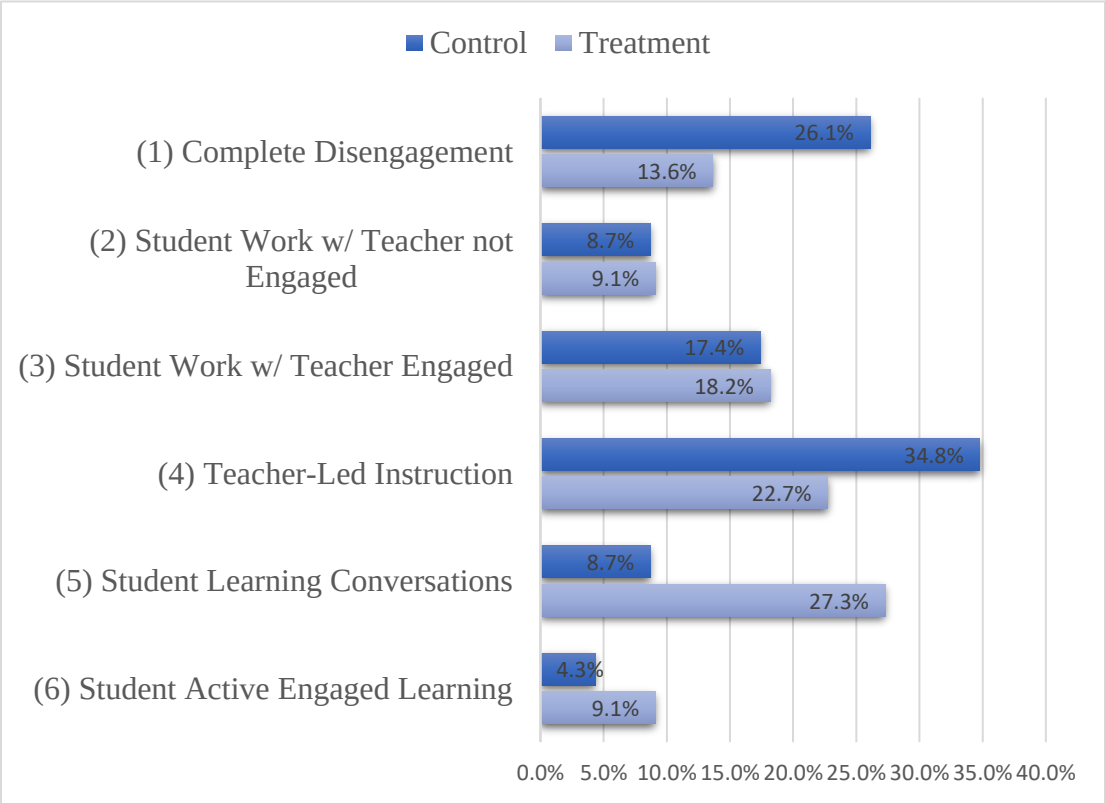

Figure 1. Engagement: Control vs. treatment, (*N*=46).

When comparing engagement between the control group and the treatment group, the engagement was significantly increased in the treatment group (Wilcoxon rank sum test, w = 172.5, p-value = 0.03981). Figure 1 also shows a decrease in the amount of engagement in teacher-led instruction for the treatment group and an increase in engagement in more cognitively complex tasks (levels 5 & 6).

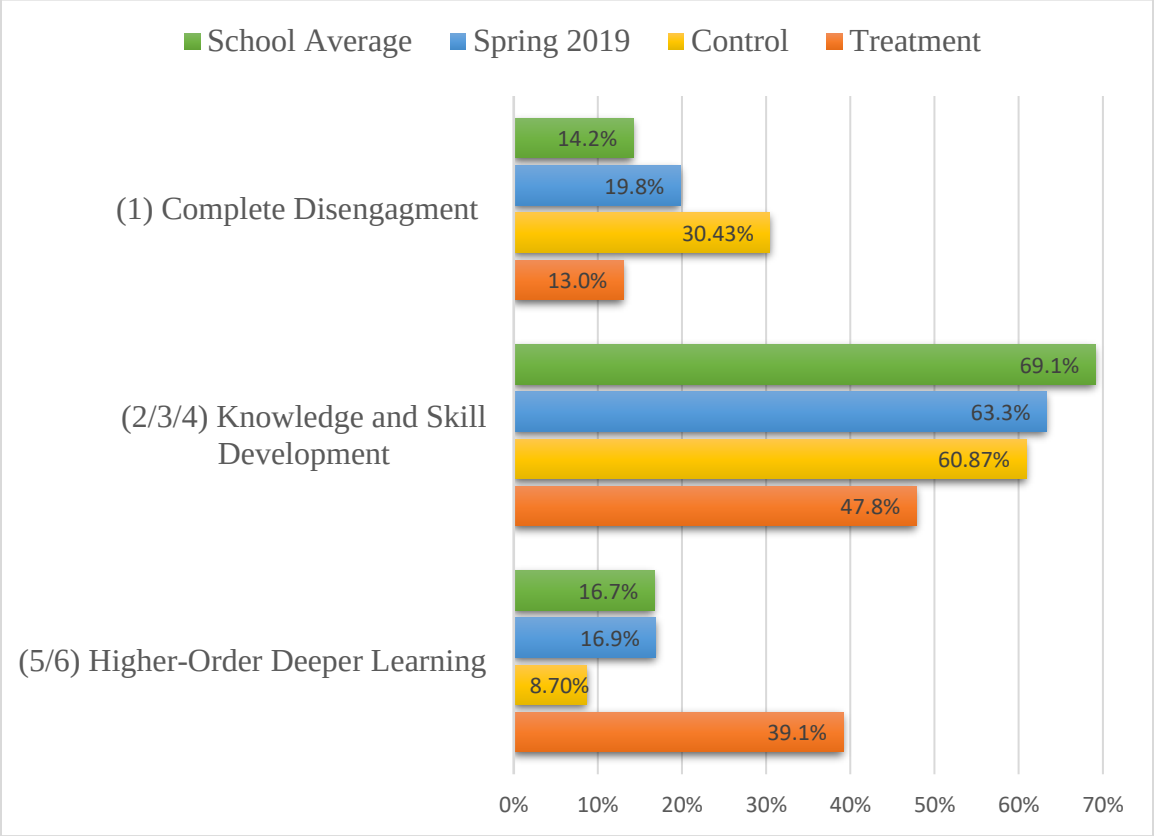

Figure 2. Engagement: Cognitive engagement levels, (*N*=46*).*

A measured difference of 22.4% above the school-wide norm (Figure 2) indicates a large increase in the engagement of student in higher-order cognitive learning when provided the treatment. The treatment did not completely prevent disengagement. In figure 2, note that complete disengagement for the treatment group is just slightly less than the school average, although not statistically significant.

Student Attitude Survey

In the alternative setting, student attitudes proved to be the most challenging data source to collect. Using enrollment data for the four courses the targeted population (*N*) was 80 students. The number of students sampled with the Student Attitude Survey was 44.

The student attitude survey did not provide much data in support of or opposed to the treatment method. All but one of the questions failed in supporting dependence on the treatment. Question #1 (Table 5), "I like going to school," showed statistical significance with treatment being linked to higher satisfaction in being at school (Pearson's Chi-squared test, df = 4, p-value = 0.04199).

Table 5
Student Attitude Survey: Question 1

Survey Question #1	"I like going to school"				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Comparison	1	6	8	3	2
Treatment	8	9	5	0	1

When asked about how they thought this class impacted their attendance, many students indicated that the treatment courses were the reason why they came to school, "I love this class, I come to school every day for this class." The same relationship was not found with question #11, "attending school is important."

Attendance

Raw attendance numbers were pulled from the school's Student Information System, PowerSchool. This data was compiled and analyzed for patterns. Table 6 shows attendance data averaged for each section as well as for the control group and the treatment group. The integrated section of physical science achieved the highest attendance with students attending class 78% of the time during the period of data collection. The non-integrated physical science section had lower attendance during that same time with students attending class 37% of the time. Students were randomly assigned to the control and treatment groups using our usual registration process.

Table 6
Attendance: Average Attendance

Course Identifier	Group	Average Attendance
Control-Earth Science	Control	65%
Control-Physical Science	Control	37%
Treatment-Earth Science	Treatment	55%
Treatment-Physical Science	Treatment	78%
	Control	49%
	Treatment	64%

The percent attendance was significantly higher in the treatment group with an average rate of attendance at 64% compared to the 49% in the control group (Welch Two Sample t-test, t = 2.5754, df = 77.851, p-value = 0.01191).

Credit

Credit earned numbers were pulled from the school's Student Information System, PowerSchool. This data was compiled and analyzed for patterns. Table 7 shows credit earned data averaged for each section as well as for the control group and the treatment group. The integrated section of physical science achieved the highest credit earning with students earning 0.56, on average, of the one credit available during the data collection period. The non-integrated physical science section had lower credit earning during that same time with students earning 0.31, on average, of the one credit available.

Table 7
Credit: Average Credit Earned

Course Identifier	Group	Average Credit Earned
Control-Earth Science	Control	0.45
Control-Physical Science	Control	0.31
Treatment-Earth Science	Treatment	0.40
Treatment-Physical Science	Treatment	0.56
	Control	0.38
	Treatment	0.48

The credit earned was not statistically higher in the treatment group in spite of an average credit earned of 0.48 compared to 0.38 in the control group (Welch Two Sample t-test, t = -0.92972, df = 72.193, p-value = 0.3556). This credit data does not include the credit earned from the other integrated course. When this credit is added, the total credit a student earns during a single class period is dramatically higher in the treatment group.

Attendance VS Credit Earned

Attendance and credit earning data individually are good indicators of student achievement, but when attendance and credit are compared across the control and treatment group these two data sources provide important insight that support engagement and student attitude findings.

In Figure 3, the attendance and credit earning were compared for the treatment group in the integrated co-taught sections. Credit earning occurred in 0.25 segments ranging from zero credit earned to one credit earned. Attendance of the treatment group ranged from 12% to 100%. The treatment group yielded a fairly linear relationship (Figure 3).

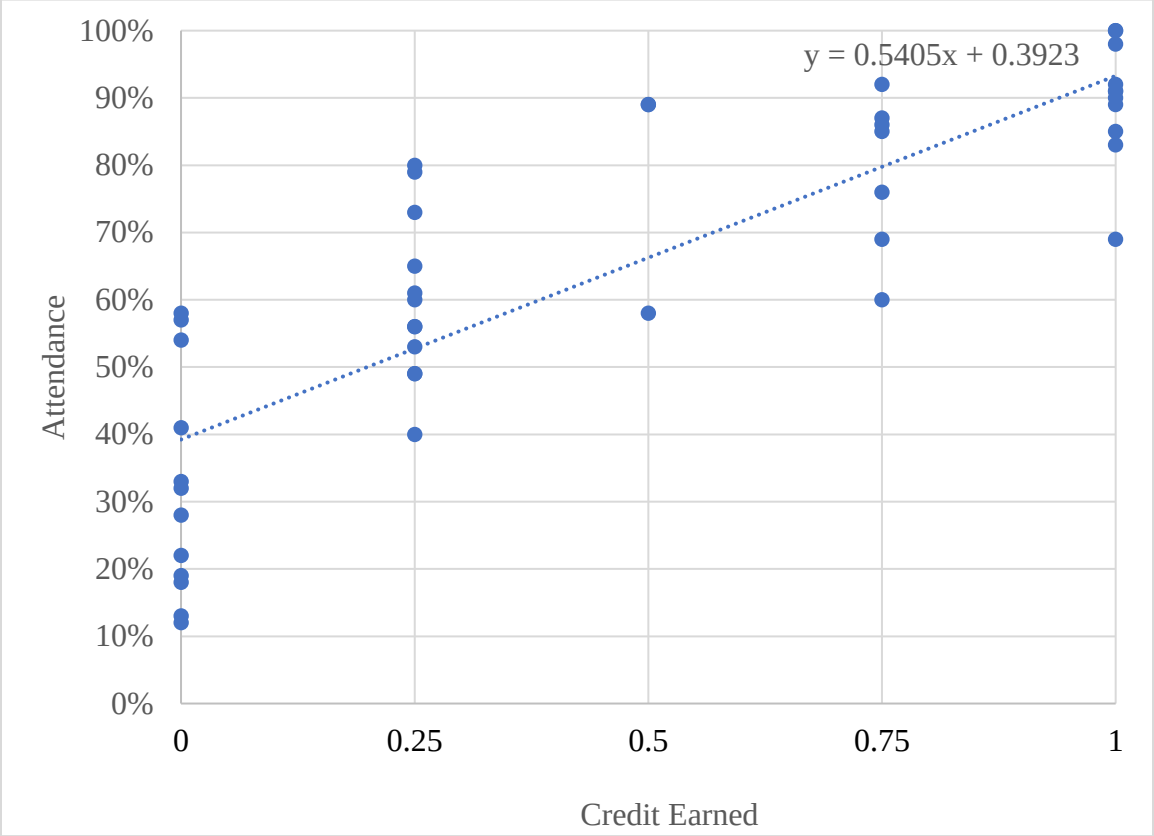

Figure 3. Treatment: Attendance vs. credit earned, (*N*=45).

When comparing the attendance to the amount of credit earned in the treatment group (Figure 3) there is a strong correlation present. Students earning the most credit also had the highest attendance. This is linked to engagement in that most students who had high attendance were also engaged, leading to high credit earning. All students (*N*=16) who achieved a credit earning at or higher than 0.75 had a percent attendance at or above 60%. Contrastingly, all students (*N*=12) who earned no credit had a percent attendance at or below 60%.

In Figure 4 the attendance and credit earning were compared for the control group in the traditional taught sections. Credit earning occurred in 0.25 segments ranging from

0 credit earned to 1 credit earned. Attendance of the control group ranged from 21% to 100%. The treatment group yielded a fairly non-linear relationship (Figure 3).

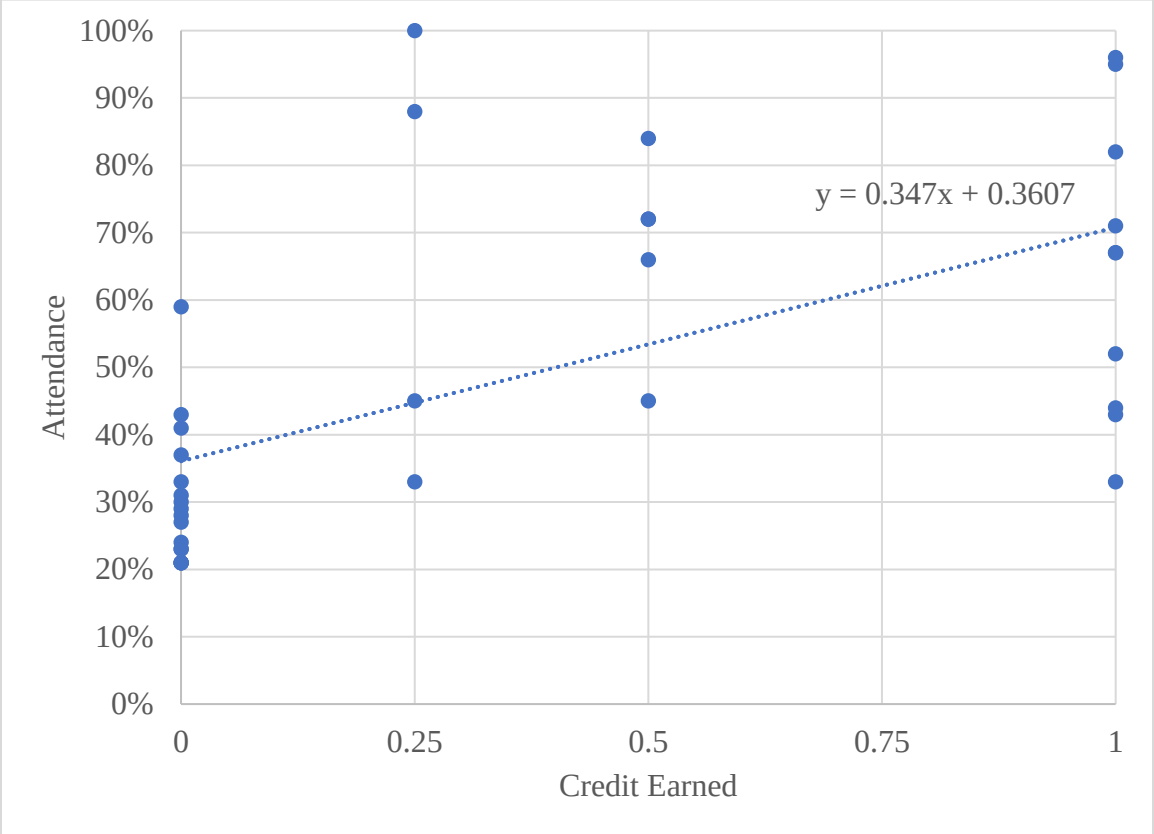

Figure 4. Control: Attendance vs. credit earned, (*N=36).*

When comparing the attendance to the amount of credit earned in the control group (Figure 4) there is little to no correlation present. Students earning the most credit (one credit) had a variety of attendance levels ranging from 95% to 33%. Conversely, students earning 0.25 or less ranged from 100% to 21%. This is linked to the engagement observed in the control group in that most students who had high attendance were not always engaged in the control group, leading to varied credit earning. Of the top ten attending students in the control group only five earned one credit, three earned 0.5, and two earned 0.25 credits.

INTERPRETATION AND CONCLUSION

This study supports the claim that offering students course experiences that are integrated, co-taught, and project-based can have positive impacts on engagement, student attendance, and attitude leading to improved course completion, outcomes for graduation and future success. During interviews (Appendix D), students often identified that they felt more involved in the integrated courses and that they were more fun. Many students also identified that they had more choice and felt in charge of their own work in the integrated courses. Some students identified that this student choice was challenging for them. They would rather "the teacher just told us what to do like they do in every other class." The positive impact on engagement found with the treatment supports other educational research including that of Loepp (1999) and Costley (2015).

When looking at data from all the collection methods (outlined in table 1), there is strong support for an integrated, team-based approach in an alternative education setting. Students were found to be more engaged and engaging in more cognitively complex tasks. Students in the treatment reported liking their school experience more than in the control group and students in the treatment group attended school at a higher rate during the data collection period. These factors contributed to better outcomes for course completion, as measured by credit earning, and high school completion. Although credit earning in science didn't significantly increase, students earned credit in both courses they were enrolled in during the class period. This dramatically increased the amount of credit students earned during their class period and contributed to improved course completion rates and high school completion. This approach has significant implications

in the alternative school setting where students are often at a deficit in credit earning in relationship to their age. In this scenario, opportunities for credit recovery and accelerated learning increase the likelihood of students completing high school. This is likely due to the engaging and individualized nature of the treatment. This finding supports Farrelly & Daniels work linking personalized learning to success in alternative schools (Farrelly & Daniels, 2014).

Using the IPI protocols allowed for the quantitative measurement of classroom engagement. This data was invaluable in linking integrated courses with engagement and course completion. Attendance and credit earning data supported these findings of increased engagement in the treatment group. When comparing credit and attendance between the two test groups (Figure 3 & 4), there was a strong correlation between the two in the treatment group. This indicates that engagement was higher in the treatment group, leading to credit earned being correlated to student attendance. When students were present they were engaged, and credit was earned. Contrastingly, in the control group, there was little to no correlation between credit earning and attendance. This led to high attending students not being engaged and therefore, not earning credit.

Another potential contributor to the success of the treatment is co-teaching. Co-teaching at the secondary level is rare but in alternative education it is used occasionally, often to provide behavioral support in the classroom. This practice is important in alternative education as it allows for addressing instruction and learning while simultaneously building personal relationships and student support. The co-teaching for this treatment allowed for teachers teaching two different content areas to collaborate and

integrate their courses. This created a more productive and engaging environment for learning. More research should be done on the benefits of co-teaching at the secondary level as well as in alternative education. This research could bring to the forefront the benefits of the co-teaching model and cause system-wide change, allowing in this model of instructional practice.

VALUE

The findings of this study validate the work done at METRO High School and support the implementation of integrated education in an alternative setting. This study contributes to the current body of research supporting these educational strategies at the secondary level and indicates a need for future research in these areas.

This work has helped me grow as an educator, empowering me to continually improve my practice and employ action research as a method to make data driven decisions at the school and classroom level. Being a teacher at METRO means trying to reach the at-risk student every day. This challenge can be daunting, lead to doubts, and even cause a feeling of helplessness. The research process has allowed me to see how action from data leads to decision making that is focused and impactful. Although the alternative education system is complex and challenging I feel I have gained a better understanding of the effectiveness of my current practice as well as a framework for how to identify and implement change within the system.

This process challenged my thinking on the impact attendance has on our practice and outcomes for students. As practitioners we often downplay attendance, assuming if we provide engaging and relevant instruction students will come. The reality is

attendance is controlled more by students' circumstances and out of school decisions than teacher instruction. In addition to this, attendance has a great deal of impact on classroom engagement, attitude, and course completion for students, attenders and non-attenders. Student who are unable to attend regularly are often hard to engage when they are present in class. This is due to their lack of connectedness in the content and their own education as well as a lack of confidence due to missing so much instruction and material. There was a measurable difference between the two sections of the treatment group across collection methods. Low attendance in the Earth science integrated section was the likely cause of these discrepancies. It is a reminder that we must improve truancy and attendance in the alternative setting while continuing to provide innovative and research-based strategies in the classroom.

I will continue to support and implement integrated courses in my building and district. Other alternative schools will benefit from this work and should be encouraged to consider similar programing as best fits in their setting and structure. I would like to learn more about individualized and competency-based instruction's role in improved outcomes for students in the treatment group. The continued collection of this data for integrated courses at METRO High School will build on the knowledge gained from this study and work to validate it results.

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APPENDICES

APPENDIX A

IRB EXEMPTION

INSTITUTIONAL REVIEW BOARD

For the Protection of Human Subjects
FWA 00000165

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MEMORANDUM

TO: Matthew Tonelli and Kathryn Solberg

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

DATE: November 10, 2018

RE: *"The Effect of Integrated, Cross-Curricular Co-Teaching on Student Achievement, Engagement, and High School Completion at an Alternative High School" [MT121018-EX]*

The above research, described in your submission of November 8, 2018, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

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

X (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

___ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.

___ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.

___ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.

___ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

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

APPENDIX B

STUDENT ATTITUDE SURVEY

Student Attitude Survey

1. School - Record the response that best describes your feelings about each statement

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I like going to school	○	○	○	○	◉
I understand how school is related to my life	○	○	○	○	○
I like science class	○	○	○	○	○
I think school is important	○	○	○	○	○
I feel safe sharing my ideas in class	○	○	○	○	○
School is not important to me	○	○	○	○	○

2. Graduation - Record the response that best describes your feelings about each statement

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I see myself graduating high school	○	○	○	○	○
I know how many credits I have and how many I need to graduate	○	○	○	○	○
Graduating is important to me	○	○	○	○	○
My family wants me to graduate	○	○	○	○	○

3. Credit - Record the response that best describes your feelings about each statement

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I understand how to earn credit in a class	○	○	○	○	○
Earning credit in a class is based on your attendance and class productivity	○	○	○	○	○
Earning credit in a class is based on how much you know or understand about a topic	○	○	○	○	○

4. Attendance - Record the response that best describes your feelings about each statement

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Attending school is important	○	○	○	○	○
I rarely miss school	○	○	○	○	○
My family makes sure I attend school	○	○	○	○	○
I have poor attendance	○	○	○	○	○
I would like to attend school more	○	○	○	○	○
My attendance has improved	○	○	○	○	○

5. Learning - Record the response that best describes your feelings about each statement

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I am a hands-on learner	○	○	○	○	○
I prefer to work individually	○	○	○	○	○
I like using technology in class	○	○	○	○	○
I know what a standard is	○	○	○	○	○
I know what it takes to be proficient in a standard	○	○	○	○	○
I do best when class is related to me	○	○	○	○	○
I prefer classes that are integrated (example: science & History)	○	○	○	○	○
I work best on a team	○	○	○	○	○
I like to work on projects	○	○	○	○	○

APPENDIX C

IPI DATA COLLECTION INSTRUMENT

IPI Data Recording Form

METRO HIGH SCHOOL DATE_____ OBSERVER_____ PERIOD OR TIME _____ PAGE NUMBER____

OBS #	TOTAL # STU'S Observed	# STU'S Observed Not Engaged	IPI CATEGORIES						Anecdotal Notes
			1	2	3	4	5	6	

OBS #	TOTAL # STU'S Observed	# STU'S Observed Not Engaged	IPI CATEGORIES						Anecdotal Notes
			1	2	3	4	5	6	

APPENDIX D

STUDENT INTERVIEW QUESTIONS

Student Interview Questions

1. What about this class helped you be more successful in the class?
2. How do you think this class impacted your attendance?
3. What's the benefit of potentially earning more credit in this class?
4. Do you feel like you were more engaged in this class than other classes?
5. Describe the difference between this class and most of your other classes?
6. Do you think having two teachers in the room helped you succeed?
7. Did learning in an integrated classroom help you learn more?