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# Impact of Career and Technical Education on Student Engagement in Small Suburban Christian Schools

## Abstract

This quantitative research study used a student engagement survey to measure the affective, behavioral, and cognitive engagement of students at three small suburban Christian schools that offer career and technical education to their students. The survey asked students to rate the level of their agreement to statements about their engagement in learning. The students represented all four grades of high school. Survey results were analyzed to compare engagement based upon participation in CTE courses, including courses that offered dual credit. The study revealed that CTE participation did, in fact, positively impact student engagement at these Christian schools, including areas of faith engagement. The study further revealed that participation in dual credit courses did not positively impact engagement.

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Action Research Project Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Education

Impact of Career and Technical Education on Student Engagement  
in Small Suburban Christian Schools

By

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Action Research Project  
Submitted in Partial Fulfillment  
of the Requirements for the  
Degree of Master of Education

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Learning happens best within community. I am grateful for mine. This community includes my family, colleagues, and students in Denver and stretches across the globe through the Education Department at Dordt University in Iowa.

I would like to dedicate this to my father. He was my first teacher. He was not a perfect teacher, nor was I a perfect student. His goal was unwaveringly for me to honor my vocation as an image bearer of our Creator. My father taught me many of the important lessons of life. Among them the ability to make things, and fix things, and take things apart and put them back together again. I long to ask him more questions.

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**Abstract**

This quantitative research study used a student engagement survey to measure the affective, behavioral, and cognitive engagement of students at three small suburban Christian schools that offer career and technical education to their students. The survey asked students to rate the level of their agreement to statements about their engagement in learning. The students represented all four grades of high school. Survey results were analyzed to compare engagement based upon participation in CTE courses, including courses that offered dual credit. The study revealed that CTE participation did, in fact, positively impact student engagement at these Christian schools, including areas of faith engagement. The study further revealed that participation in dual credit courses did not positively impact engagement.



The discussion about the purpose of education has been both loud and long. Sinek (2010) in his TED Talk has encouraged millions of people and businesses to start with their ‘why’ to gain the best results. With the development of compulsory, universally available education came the debate about the why of education. Shall the why of education continue in the centuries old utilitarian tradition of preparing students for their various places of work in a society? Or might a more humanistic approach lead us to educate students with the goal of developing citizens for full participation in life itself? Any discussion that digs down to the why of a system or institution will have significant impacts on that system or institution. The philosophical and theological tension and how to balance those tensions will help schools, including Denver Christian School, develop a program that adheres to their why.

A 21st century school must navigate this divide by answering affirmatively to both sides of this debate, teaching both the skills needed to uncover and develop identity and character of students for training as future good citizens, as well as connecting their learning to their future roles of vocation. The latest developments in Career and Technical Education (CTE) offer schools one way to build a bridge between these philosophical questions of education. The federal government encouraged vocational training by strengthening the Perkins Act in both 2006 and 2018 with the passage of Perkins IV and V, respectively (Michaels & Lui, 2020). Perkins IV even changed the nomenclature of the entire field. What was once referred to as ‘vocational education’ has since been referred to as CTE (Michaels & Lui, 2020). The federal government has incentivized the implementation of CTE programs for 150 years in some form or another. The last reported statistics from the US Department of Education show that 98% of high school students across the country have access to some form of CTE education, with 92% of high school students taking advantage of those programs (*CTE Today*. ACTEonline, 2021).

When considering CTE programs, it is important to remember that

Career-technical education is not a lesser form of learning; it's a different form of learning. CTE courses are brimming with opportunities for teachers to integrate literacy and math skills as real-life applications. And ultimately, isn't that what learning is all about — real-life skills that benefit the individual and the community? (Michaels & Barone, 2020, p. 3)

The ubiquity of these programs requires all schools, including private institutions, to consider how they are meeting the expectations of their communities as it relates to CTE programs.

As smaller private schools look to provide the best education for their students and their community, they must seriously contemplate how they will meet CTE standards within their curricular program. Denver Christian School is just one of those schools. The latest language of CTE, as read in Perkins V, gives wide freedom in linking learning to future plans of students in both college and career readiness (Castellano et al., 2017; Hodge, et al., 2020; Michaels & Lui, 2020).

### **Purpose of the Study**

This study provided research-based criteria on the impact that CTE curriculum has on student engagement for the consideration of implementing CTE curriculum at Denver Christian High School and on the impact that CTE curriculum has on levels of student engagement in affective, behavioral, and cognitive areas. The study provided data on a possible added benefit of helping student engagement in the area of faith formation as well. Finally, this study looked at research questions comparing student engagement in connection to CTE participation, including participation in dual credit courses.

## Research Questions

The overarching research question asked if participation in CTE positively impacts student learning culture in a Christian school setting. More specifically, the study sought to answer

1. What impact does CTE programming have on the areas of affective engagement, behavioral engagement, cognitive engagement, and faith formation engagement?
2. What impact does dual credit enrollment have on the student engagement in the areas of affective engagement, behavioral engagement, and cognitive engagement?
3. Does the delivery method of the CTE curriculum impact the levels of student engagement?

## Definition of Terms

The following terms will be used regularly throughout this paper. The definitions given are those of the researcher unless otherwise noted.

Affective Engagement - a student's liking for school and learning. (Diehl, 2020).

Academy Model/Academies - Creating a school within a school for implementing CTE curriculum. A Program of study moves somewhat independently within the larger school context.

Behavioral Engagement - student academic compliance and persistence in learning (Geraci, 2017).

CTE - Career and Technical Education, formerly known as vocational education, is a term applied to schools, institutions, and educational programs which specialize in skilled trades, applied sciences, modern technologies, and career preparation (ACTE, 2021).

Cognitive Engagement - student effort and self-motivation in mastering the tasks and curriculum they are asked to complete

Perkins Act - The Carl D. Perkins Vocational and Technical Education and Applied Technology Advancement Act Amendments of 1990 was the first in a series of federal legislation mandating states implement CTE in their schools.

POS - Program of Study. Usually a series of between four – ten courses (Arneson, et al., 2020; Michaels & Lui, 2020).

Student Engagement - student involvement and enthusiasm for school.

Tracking - the tendency for schools to group or separate students by academic ability.

### **Literature Review**

The implementation of CTE curriculum programs is no longer a choice for school districts around the country. As this trend has continued across the educational spectrum, private and parochial schools will also have to answer questions dealing with the implementation of CTE in their curriculum. The Association for Career and Technical Education cites US Department of education statistics that 92% of high school students participate in CTE curriculum, with CTE programs of some type being available to 97% of US students (*CTE Today*. ACTE. 2021, May). The way in which these programs are implemented varies greatly, and private schools must be ready to determine if, and how, they should include these programs in their schools.

The incentives to add career training education and skills to the educational systems in the United States may rightly be traced back to the Morrill Act of 1862, which encouraged states to establish land-grant colleges with both land and money provided by the federal government. These colleges would focus on agriculture, manufacturing arts, and military tactics, leading to the creative naming of schools like Texas A&M, Colorado A&M, Oklahoma A&M, etc. (Miller, 2016).

Modern career education began to take shape in 1990 with the passage of the Carl D. Perkins Act (Michaels & Lui, 2020). After a couple of decades of declining participation, this legislation sought to modernize, standardize, and align vocational education in the United States (Loveland, et al., 2020; Michaels & Lui, 2020). The Perkins Act has been reauthorized,

amended, expanded, and renamed several times since its initial passing in 1990. Those changes are evidence that there is an abiding commitment to CTE in the United States. Although the Perkins Act was reauthorized several times, significant changes came with the passage of Perkins IV and Perkins V in 2006 and 2018, respectively (Michaels & Lui, 2020). The most recognizable change brought about by Perkins IV may be the retirement of the term ‘vocational education’ for the currently used ‘career and technical education’ (Michaels & Lui, 2020). Giani (2019) points out that the legislation itself was far more impactful than just a name change as it attempted to establish “coherent and rigorous content aligned with challenging academic standards and relevant career and technical content” (p.1006).

The codification of CTE requirements that must be met to collect federal funds significantly changed the nature of CTE. One of those significant requirements was the mandate for districts to create programs of study (POS). These POS require the integration of academic standards and industry-related credentials in a designed three-to five-course curriculum (Diehl, 2020). Districts must be aware that the creation of these POS might have the tendency to create separate educational tracks and inequities in regard to the use of resources, including funds, planning and teacher experience (Domina, Penner & Penner, 2017). Perkins VI also introduced the practice of districts granting postsecondary academic credit for the completion of these POS (Diehl, 2020). Both the creation of POS such as STEM curriculums and the offering of dual credit greatly expanded the pathways by which districts could meet the mandates of Perkins IV.

That expansion continued with the passage of Perkins V in 2018. This iteration of Perkins V shows the extent of broad support for CTE. Titled the *Strengthening Career and Technical Education for the 21st Century Act*, it passed the House of Representatives by a vote of 405 to 5. At a time when political division seems to dominate every area of public life, there was almost unanimous support for this legislation. This latest edition of Perkins expanded both the funds

granted for meeting the CTE mandates and the flexibility in meeting them (Michaels & Lui, 2020; Perry, 2019). Perkins V also doubled down on districts creating and expanding CTE programs that:

consider dual and concurrent enrollment and early college high schools (otherwise known as college in high school programs) as a pathway for postsecondary attainment in a student's desired career field. Schools around the country have demonstrated that college in high school programs can propel students toward valuable, portable college credentials and degrees. (Perry, 2019, p. 16)

This expansion of CTE programs and their availability certainly reflects the current attitude toward them in the United States. The broadening definition of CTE means that there are more and more choices for how a school, a district, or a state might fulfill the legislative mandates of CTE. All of those choices may not be feasible for smaller districts or schools, but they are worth noting for a couple of reasons. Many private school students have access to the CTE programs offered by their public school district. Secondly, the method of implementation can influence the benefits of the CTE program. The selection of a method of delivery forces schools to understand how the implementation of CTE impacts tracking and therefore participation from varying student groups (Hodge, et al., 2020). Many larger school districts have stand-alone CTE high schools. These schools operate as magnet schools for students who are interested in gaining an education that is focused on the vocational skills needed for a particular industry or career path. Currently, more and more districts and schools are offering career academies within their schools. These career academies are typically set up to allow students to take a core curriculum that resembles a traditional high school education, while at the same time taking elective courses that focus on one of the POS that falls under the CTE umbrella. This model allows the CTE standards to be integrated into all areas of the curriculum. In fact, there

are large districts around the country that have converted wholly to this career academy model (Hodge, et al., 2020).

Creating stand-alone CTE schools as well as CTE academies is not without limitation. Hodge et al. (2020) points out two of those in his work. The first concern is limited access to popular programs due to growing interest in CTE; as he stated, “has also, however, raised questions about adequate access to such programs because, in most states where these options exist, interest in the schools exceeds capacity to serve students, thus creating the potential for unequal access to high-status, STEM-focused programs” (p. 11). A second danger of the career academies model deals once again with the danger of tracking. Tracking of students into various academies has the potential to lead to inequitable access and resource allocation (Gianni, 2019; Hodge, et al., 2020). Whatever delivery method a school chooses to use to meet CTE mandates must be properly scrutinized.

Much research has already been done that explores the benefits of implementing a CTE curriculum. An implemented program of CTE standards and curriculum helps spread the responsibility of preparing students for their future across the curricular offerings as well as giving more teachers the ability to connect lessons and integrate educational standards in real life learning (Michaels & Barone, 2020). The connecting of these standards both horizontally across the curriculum and vertically across time allows for something that may be referred to as linked learning (Castellano, et al., 2017). Schools that have implemented CTE standards have seen increased composite ACT scores of more than one point for students who participated in and completed CTE programs (Dougherty, et al., 2019; Michels & Barone, 2020; Michaels & Lui, 2020). Michaels and Lui (2020) also successfully showed that the increase in ACT scores was noted in all four of the cohorts they studied (Skilled Tech, Information Tech, Hospitality, Health Science). Studies have also shown that students who participate in CTE programs have higher

rates of graduation (Arneson, et al., 2020; Castellano et al. 2017; Hodge, et al., 2020; Michaels & Lui, 2020;). A study of CTE students in Oregon concluded that four-year graduation rates increased by 26% across all cohorts for students who completed a CTE program of study (Arneson, et al., 2020). Students who concentrate on CTE by completing a POS are not only more likely to graduate, but they also enroll in post-secondary education at higher levels and have higher rates of completion of that post-secondary education (Gianni, 2020). The positive academic outcomes of CTE programs have been widely documented.

The advantages of participation in CTE programs are not limited to increased academic outcomes, graduation rates, and post-secondary enrollment and persistence. Studies have consistently shown that participation in CTE programs increases student engagement, and that engagement is a predictor of academic success (Hodge et al., 2020). Although there is some variance in questioning and method, student engagement surveys generally measure engagement in three areas. Affective engagement refers to a student's liking for school and learning. "Higher levels of affective engagement are associated with greater academic achievement..." (Diehl, 2020, p. 45). Behavioral engagement refers to student academic compliance and persistence in learning. Cognitive engagement refers to student effort and self-motivation in mastering the tasks and curriculum they are asked to complete (Diehl, 2020; Geraci, et al., 2017). Measuring student engagement is not as clear as measuring ACT scores, yet it plays an important role in student achievement.

The way in which engagement affects education is also more difficult to define clearly. Research seems to show, and educational theorists agree, that affective engagement is a result of higher levels of behavioral and cognitive engagement (Diehl, 2020). Students participating in CTE reported higher rates of seeing that their education gave them the ability to learn real life skills over students who did not participate (Michaels & Barone, 2020). CTE programs and standards hope to connect students and their learning to their future. Ideally, the question "when



am I ever going to use this in real life?” would disappear if properly implemented.

The way in which CTE can connect students to their learning community is also worth studying. Studies have shown that CTE participation is beneficial for student engagement until students reach the point where they begin to separate from their learning community (Diehl, 2020). While Diehl argues that too much CTE may result in a separation from the learning community, Kriesman and Strange (2019) encourage schools to implement CTE programs that allow students to participate in a way that allows them to gain enough depth within that POS. Schools must find a balance.

The evidence is clear that CTE programs have a positive impact on academic achievement, preparation for college and career, as well as higher levels of student engagement. Small private and parochial schools have, on average, higher success in these areas (Geraci, et al., 2017). Understanding how and why CTE programs increase success in various areas is important for schools as they consider how and why a CTE curriculum might be implemented. At the same time, individual schools must understand what improvements they can expect from any change in program or curriculum.

### **Methodology**

This quantitative study used student engagement feedback as a gauge for measuring the learning environment in school. Diehl (2020) used student engagement survey feedback to show that CTE has a positive impact on learning culture as measured by affective engagement. This research resembled the Diehl study with the following differentiations: First, this research sought to determine what type of impact CTE participation has at schools that tend to enjoy students that are highly successful and engaged already. And second, this research included questions that asked students if their participation in CTE had improved their own understanding of their vocation as image bearers of God.

The independent variable that was tested is the level of participation in CTE curriculum.

Survey items asked students to identify the number of CTE courses they are currently involved in as well as the number of CTE courses they have been involved in over the course of their high school career. Demographic information allowed results to be studied by school, by participation level, and if dual credit courses were part of their CTE experience. This information allowed the research to not only measure the possible impact of CTE on student engagement, but also determine if that engagement was impacted by the number of courses taken. This was a significant question because Diehl (2020) concluded from his research that too much CTE actually begins to isolate students from their school and has a negative impact on student engagement.

The survey is based upon Diehl's (2020) work as well as the SESQ-ENG survey that was created by educational researchers from 19 countries and presented by Lam & Jimerson (2008). These survey items were asked on a four-point Likert scale rating from 'strongly disagree' to 'strongly agree.' These questions allowed CTE participants to report if they believed their CTE classes have improved their own engagement. This allowed insight into improvement, even if participants had a lower engagement score than non-participants.

### **Participants**

Permission to participate in this study was granted by three private Christian schools. These schools were chosen because they offer enough similarity to Denver Christian. They are relatively suburban and of similar size. School 1 is home to just over 400 students in Las Vegas, Nevada. About 40% of the students at School 1 are involved in their learning academies, which the school uses to deliver its CTE curriculum. School 2 is located in southern California and has a diverse population of just under 400. School 2 shares similarities with Denver Christian in that it is historically Kuyprian and serves a mostly college prep clientele. School 2 does not divide their school into academies, but offers CTE curriculum in a traditionally vocational education

model. School 3 is a midwest Christian school that serves about 275 students. School 3 is closest in size to Denver Christian and offers some in-house courses that could be considered CTE, but much of their CTE is delivered through the public school system and local colleges. A total of 1,040 students had access to the survey with 388 respondents. The participation rate was just over 37%.

### **Results**

A review of the data has revealed several things. The first thing that deserves attention is the fact that the students from these Christian schools are highly engaged. This comes as no surprise as these three schools have enjoyed strong academic success and high levels of student participation.

**Table 1***Student Strength of Agreement Responses*

	Survey Item	Agree	Strongly Agree	Total
1	I think what we are learning in school is fun.	42%	21%	63%
2	I like what I am learning in school.	44%	22%	66%
3	I enjoy learning new things in class.	39%	40%	79%
4	I am proud to be at this school.	37%	39%	76%
5	Most days, I look forward to coming to school.	35%	17%	52%
6	I participate in school activities beyond the classroom.	24%	45%	69%
7	My participation in CTE courses has increased my enjoyment of school. Answer only if you have taken CTE courses.	33%	40%	73%
8	I enjoy good relationships with my teachers	36%	54%	90%
9	I enjoy good relationships with my CTE course teachers. Answer only if you have taken CTE courses.	29%	56%	85%
10	I enjoy good relationships with my peers at school.	26%	66%	92%
11	In class, I work as hard as I can.	51%	37%	88%
12	When I'm in class, I participate by engaging in discussions, asking questions, and helping in group work.	40%	38%	78%
13	I pay attention in class.	50%	37%	87%
14	When I run into a difficult homework problem, I keep working until I think I have solved it.	42%	29%	71%
15	When I study, I try to understand the material better by relating it to things I already know.	44%	32%	76%
16	When I study, I try to figure out how the information might be useful in the real world.	33%	30%	63%
17	I see how my classes in school help me discover my unique identity as a child of God.	37%	25%	62%
18	I can connect the things I am learning to my future in college or the workforce.	43%	28%	71%
19	My participation in CTE courses has allowed me to become a better student in school.	42%	31%	73%
20	I see how my classes help me understand what it means to bear God's image.	37%	27%	64%
21	When studying, I try to combine different pieces of information from course material in new ways.	42%	21%	63%
22	I try to match what I already know with things that I am trying to learn for school.	47%	24%	71%
23	My participation in CTE courses has helped me discover my unique identity as a child of God.	32%	29%	61%

The overall positivity rate for all students surveyed in Table 1 is 73%. It is worth noting that the positivity rate expressed on the three questions that asked students to respond to the level to which they saw their courses developing their identity as Christians was a little lower than the total. That rate was 62%, as shown in Table 2. An 11% reduction in strength of agreement response merits some further study.

**Table 2**

*Student Strength of Agreement Responses to Faith Formation Survey Items*

	Survey Item	Agree	Strongly Agree	Total
17	I see how my classes in school help me discover my unique identity as a child of God.	37%	25%	62%
20	I see how my classes help me understand what it means to bear God's image.	37%	27%	64%
23	My participation in CTE courses has helped me discover my unique identity as a child of God.	32%	29%	61%

The survey also showed that participation in CTE courses does have a positive impact on student engagement. The data provided by the survey was analyzed to see the impact that CTE participation and dual credit course participation has on affective, behavioral, and cognitive student engagement. This comparison is important as the most recent changes in CTE legislation (Perkins V) makes dual credit courses a popular way for schools across the country to meet the requirements of this law and procure the millions of dollars that are connected to it. This option is also one that speaks positively to the communities that are represented in many suburban private Christian schools. This statistical analysis is located in Tables 4, 6, 8, and 14.

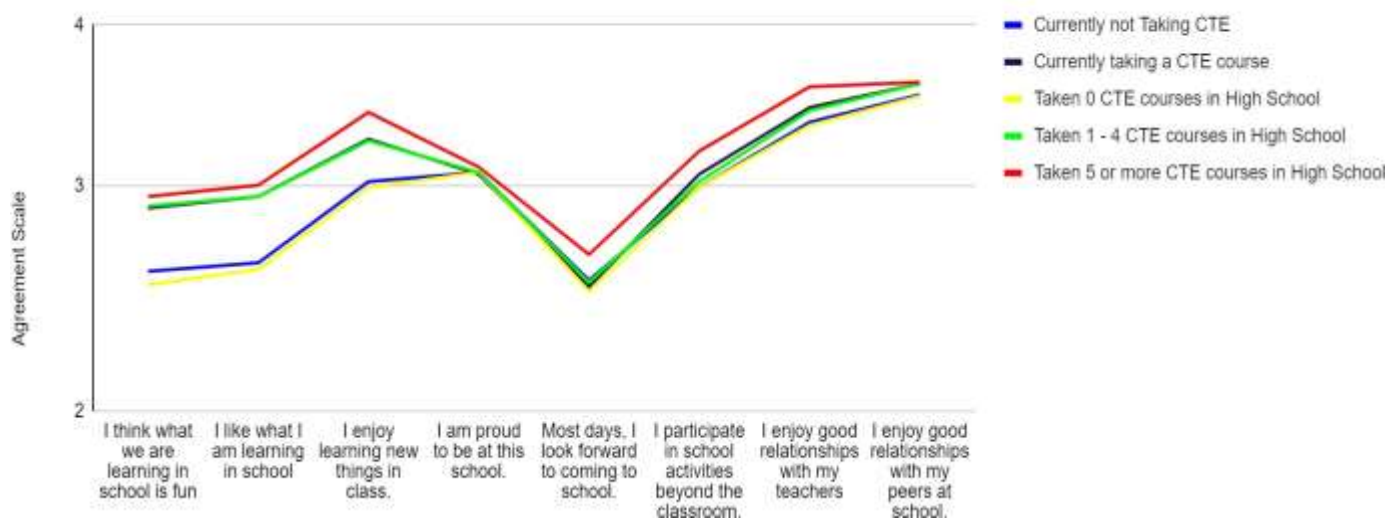
### Impact on Affective Engagement

High levels of student engagement have a positive impact on both student achievement and a positive learning environment (Deihl, 2020). Figure 1 gives a visual representation of the impact different levels of participation in CTE courses has on affective engagement.

**Figure 1**

*Mean Scores Comparison: Affective Engagement - CTE*

Affective Engagement: Liking for learning and School



Questions 1-3 in Figure 1 address a student's liking for learning, while questions 4-8 address a student's liking for their school. It is clear that participation in CTE courses does have a positive effect on affective engagement scores, and further that the impact is greater on a student's liking for learning than their liking for their school. It is also clear that taking more CTE courses has a greater positive impact on the affective engagement scores.

**Table 3***Statistical Impact Based on CTE Participation - Affective Engagement*

Survey Item	No CTE Participation	CTE Participation	p-value
I think what we are learning in school is fun	2.4	2.96	.00687
I like what I am learning in school	2.49	3.00	<.0001
I enjoy learning new things in class	2.94	3.42	<.0001
I am proud to be at this school	3.07	3.10	.4658
Most days, I look forward to coming to school	2.36	2.65	.0131
I participate in school activities beyond the classroom	2.93	3.19	.1473
I enjoy good relationships with my teachers	3.28	3.58	.0046
I enjoy good relationships with my peers at school	3.51	3.61	.1602

Table 3 lists the numerical difference more clearly. For brevity and clarity, the statistical change is compared only for students involved in CTE against those not involved. For each question, a t-test calculation was performed and then that number was used to calculate a p-value. A p-value of less than .05 represents that there is a statistically significant difference between the two groups. The data and calculations show that participation in CTE has a significant statistical impact on student affective engagement in the area of liking for learning (questions 1-3), while having a somewhat mixed impact on the affective engagement area liking for school. Only two of the five items in the liking for school questions show a significant statistical change between participants and non-participants.

The data was also analyzed to compare student responses between students involved in dual credit courses and those not involved.

**Figure 2**

*Mean Scores Comparison: Affective Engagement - Dual Credit*

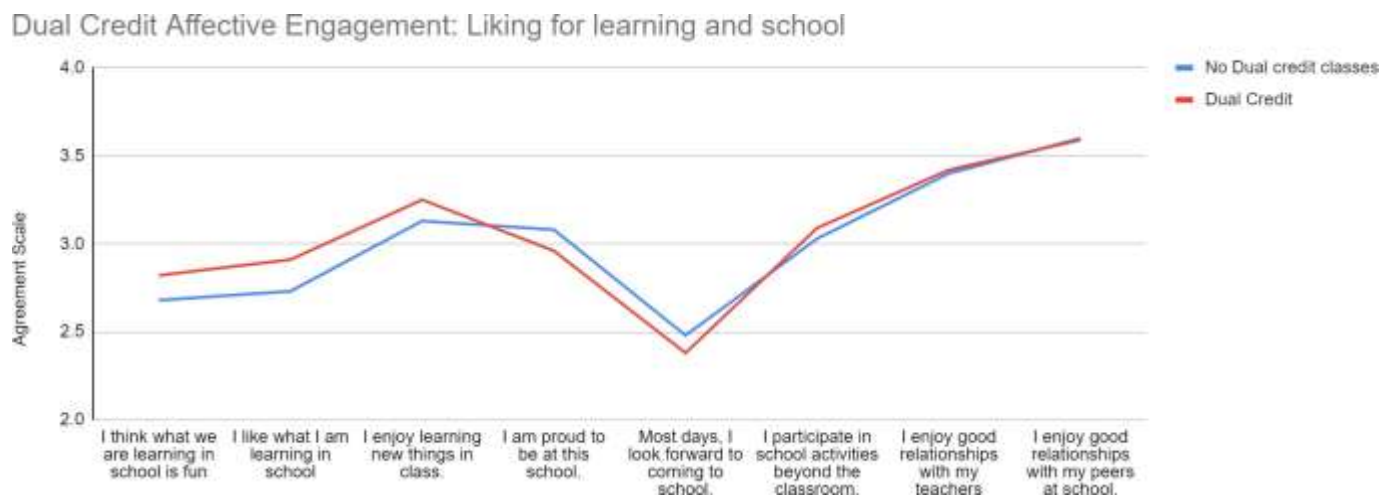


Figure 2 shows us the comparison of the impact of dual credit participation on student engagement and illustrates that participation in dual credit courses does not have an impact on student engagement.

**Table 4**

*Statistical Impact on Affective Engagement - Dual Credit Participation*

Survey Item	No Dual Credit Participation	Dual Credit Participation	p-value
I think what we are learning in school is fun	2.68	2.82	.154
I like what I am learning in school	2.73	2.91	.062
I enjoy learning new things in class	3.13	3.25	.2
I am proud to be at this school	3.08	2.96	.2466
Most days, I look forward to coming to school	2.48	2.38	.3526
I participate in school activities beyond the classroom	3.03	3.09	.6113
I enjoy good relationships with my teachers	3.4	3.42	.8111
I enjoy good relationships with my peers at school	3.6	3.59	.8921



The statistical analysis in Table 4 also reflects this smaller impact. The statistical change is noticeably smaller with this data group. Applying the same formula to calculate a p-value, we notice that there was no significant statistical change in any of the affective engagement categories. Although the statistical average is very small, it is worth noting that participation in dual credit classes had a negative impact on the agreement averages reported by students. This is noticed in four of the five questions that deal with affective engagement tied to a student's liking of their school.

### Impact on Behavioral Engagement

A second area of engagement that is often measured to help researchers understand academic success in learning communities is the area of behavioral engagement. Behavioral engagement is more than just compliance in the classroom and hallways. Its more important function is to measure the student's academic compliance in following learning instruction and their obedience in completing the learning tasks.

**Figure 3**

*Mean Scores Comparison: Behavioral Engagement - CTE*

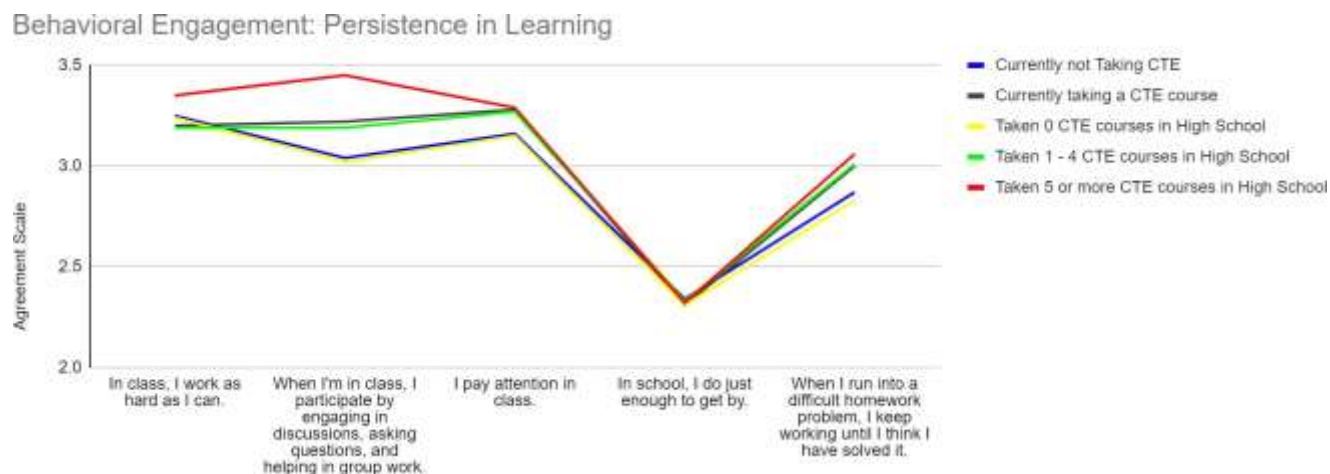


Figure 3 gives us a visual representation of the data. It is notable that the impact on behavioral engagement seems to be much smaller.

**Table 5**

*Statistical Impact on Behavioral Engagement - CTE Participation*

Survey Item	No CTE participation	CTE participation	p-value
In class, I work as hard as I can.	3.18	3.25	.3459
When I'm in class, I participate by engaging in discussions, asking questions, and helping in group work.	3.03	3.22	.0242
I pay attention in class.	3.10	3.30	.0069
In school, I do just enough to get by.	2.32	2.32	1.000
When I run into a difficult homework problem, I keep working until I think I have solved it.	2.89	2.98	.3608

Table 5 reveals a significant statistical change on student behavioral engagement in the statements that deal with class participation in both active participation in class and a more passive participation in paying attention while in class.

**Figure 4**

*Mean Scores Comparison: Behavioral Engagement - Dual Credit*

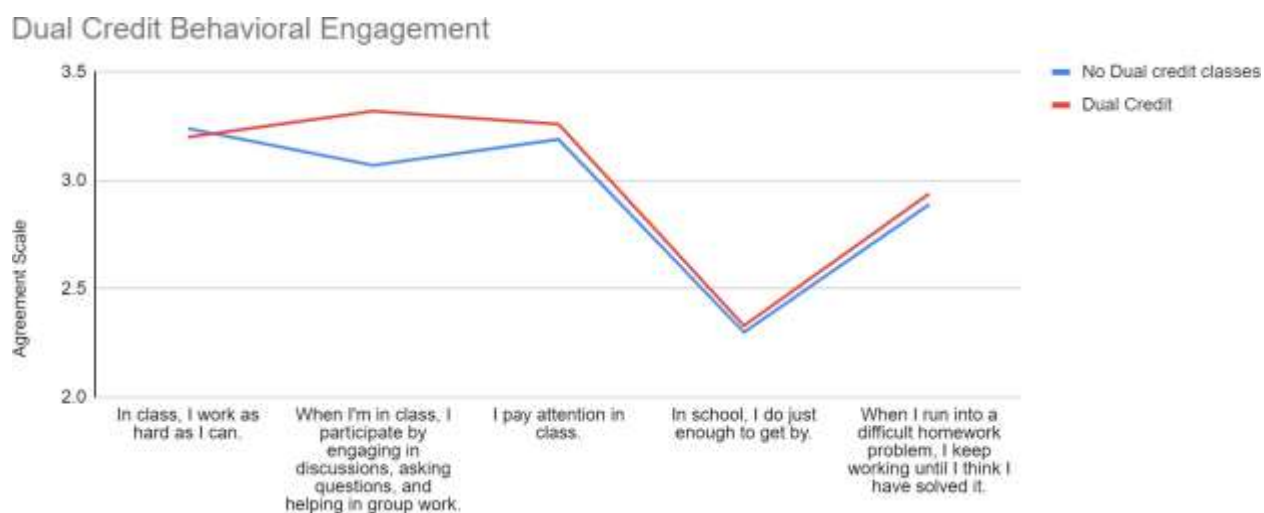


Figure 4 is a visual representation of the impact of dual credit CTE involvement on behavioral engagement.

**Table 6**

*Statistical Impact on Behavioral Engagement - Dual Credit Participation*

Survey Item	No Dual credit participation	Dual credit participation	p-value
In class, I work as hard as I can.	3.24	3.2	.6135
When I'm in class, I participate by engaging in discussions, asking questions, and helping in group work.	3.07	3.32	.0054
I pay attention in class.	3.19	3.26	.3753
In school, I do just enough to get by.	2.3	2.33	.7879
When I run into a difficult homework problem, I keep working until I think I have solved it.	2.89	2.94	.5937

The statistical analysis of the data reveals that participation in dual credit courses has significant statistical impact on one of the same items in the area of behavioral engagement, as Table 6 reveals. The impact is seen on active participation in the classroom.

### Impact on Cognitive Engagement

**Figure 5**

*Mean Scores Comparison: Cognitive Engagement - CTE*

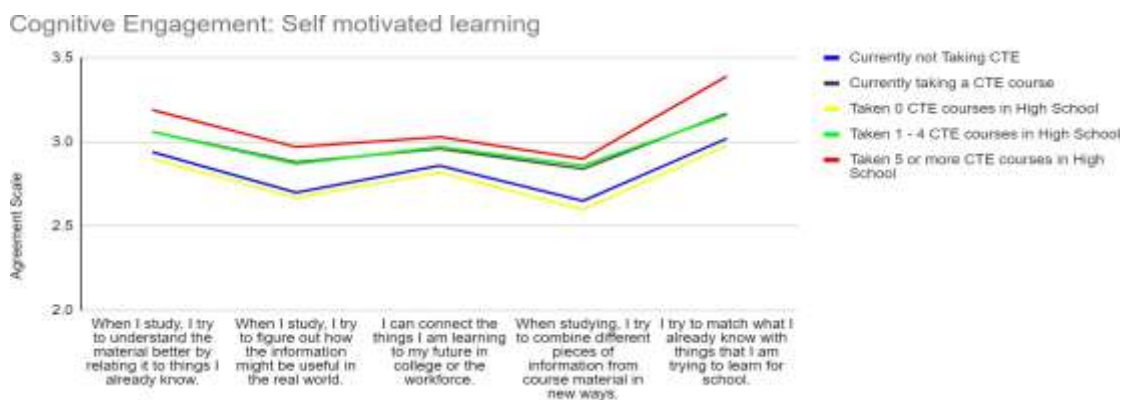


Figure 5 reveals the mean agreement responses to five statements about cognitive engagement. This area of engagement shows a consistently significant difference in average student response.

**Table 7**

*Statistical Impact on Cognitive Engagement - CTE Participation*

Survey Item	Taken No CTE courses	CTE participation	p-value
When I study, I try to understand the material better by relating it to things I already know.	2.91	3.07	.0736
When I study, I try to figure out how the information might be useful in the real world	2.65	2.89	.0202
I can connect the things I am learning to my future in college or the workforce.	2.76	3.02	.0045
When studying, I try to combine different pieces of information from course material in new ways.	2.59	2.86	.0026
I try to match what I already know with things that I am trying to learn for school.	2.95	3.20	.0029

Table 7 contains the statistical analysis of the data. The data reveals that four of the five areas of cognitive engagement show significant statistical changes when participation in CTE courses is factored. Four of those five items have very significant changes. Only the first item on Table 7, “When I study, I try to understand the material better by relating it to things I already know”, does not meet the criteria for significant statistical impact when the p-value is calculated, yet it is quite close.

Figure 6 shows a visual representation of the mean responses to the cognitive engagement of the survey for students who take classes for dual credit compared to those who do not.

**Figure 6**

*Mean Scores Comparison: Cognitive Engagement - Dual Credit*

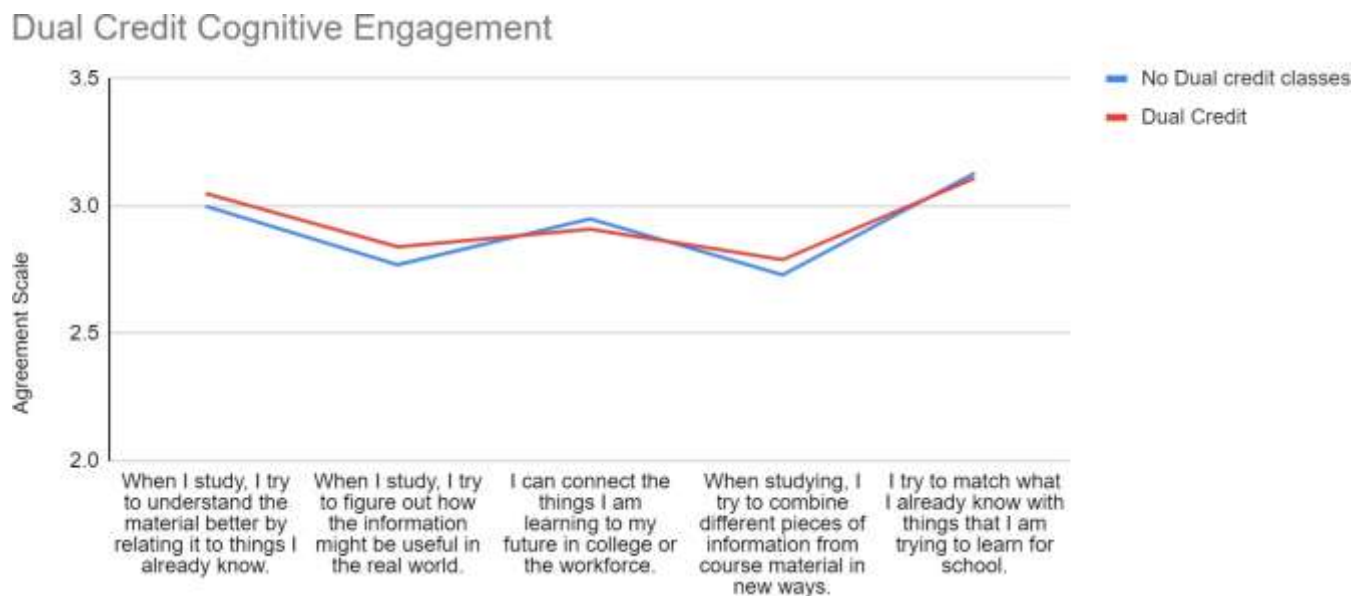


Table 8 reveals that participation in dual credit courses does not have a significant statistical impact on student cognitive engagement.

**Table 8**

*Statistical Impact on Cognitive Engagement - Dual Credit Participation*

Survey Item	No dual credit participation	Dual credit participation	p-value
When I study, I try to understand the material better by relating it to things I already know.	3.0	3.05	.5999
When I study, I try to figure out how the information might be useful in the real world	2.77	2.84	.5265
I can connect the things I am learning to my future in college or the workforce.	2.95	2.91	.7226
When studying, I try to combine different pieces of information from course material in new ways.	2.73	2.77	.6844
I try to match what I already know with things that I am trying to learn for school.	3.13	3.11	.8243

### Comparison of CTE Implementation Model

The data collected also allows an analysis of the impact that the model of CTE implementation has on student engagement. School 1 employs an academy model of CTE curriculum with approximately 40% of their students participating in one of their academies. The analysis of this data combined average responses in the areas of affective engagement, behavioral engagement, and cognitive engagement. Table 9 illustrates the comparisons made within School 1.

**Table 9**

*Statistical Impact of Academy Model on Student Engagement - School 1*

Engagement Area	No CTE	CTE	p-value
Affective Engagement	2.797	2.97	.0438
Behavioral Engagement	2.861	2.979	.0927
Cognitive Engagement	2.763	2.790	.7780

The results of the t-test for the academy model, Table 9, demonstrate a significant statistical change in affective engagement. Behavioral engagement is not quite a significant statistical change. Cognitive engagement does not show a significant statistical change.

Table 10 compares the areas of engagement at School 2, whose model is more traditional.

**Table 10**

*Statistical Impact of Traditional Model on Student Engagement - School 2*

Engagement Area	No CTE	CTE	p-value
Affective Engagement	2.91	3.27	.0378
Behavioral Engagement	2.94	3.14	.0924
Cognitive Engagement	2.69	3.18	.013

The results for the traditional model are a bit trickier. School 2, which delivers their limited and traditional CTE course offering in house, seems to have a significant impact on their student engagement. Both the areas of affective engagement and cognitive engagement showed significant statistical change. In addition, the area of behavioral engagement was close to being a significant statistical change.

Student engagement within School 3 is analyzed in Table 11.

**Table 11**

*Statistical Impact of Outsourced Model - School 3*

School 3 - traditional implementation with added outside educational organizations.	No CTE	CTE	p-value
Affective Engagement	3.24	3.26	.8304
Behavioral Engagement	3.18	3.12	.593
Cognitive Engagement	3.16	3.12	.7104

School 3 offers a little broader range of CTE offerings, but much of that is offered through outside educational organizations. The data show that there was no significant statistical change in student engagement response in any of the three areas.

### **Impact on Faith Engagement**

The final area of statistical analysis in this research is in faith development or faith formation. Are students able to engage with their learning in such a way that they recognize that their courses are helping to develop their identity as students who bear the image of God? Three survey items were used to gauge this area of engagement. Table 12 reveals that the strength of agreement on these three areas was, on average, 11% lower than the other areas of student engagement.

**Table 12***Strength of Agreement Responses on Faith Formation*

	Survey Item	Agree	Strongly Agree	Total
17	I see how my classes in school help me discover my unique identity as a child of God.	37%	25%	62%
20	I see how my classes help me understand what it means to bear God's image.	37%	27%	64%
23	My participation in CTE courses has helped me discover my unique identity as a child of God.	32%	29%	61%

Visually we can see that involvement in CTE courses does, in fact, have an impact on the strength of agreement on each of these survey items, as Figure 7 shows. Note that the final item is a comparison between the level of CTE involvement, not a comparison between no CTE involvement and any amount.

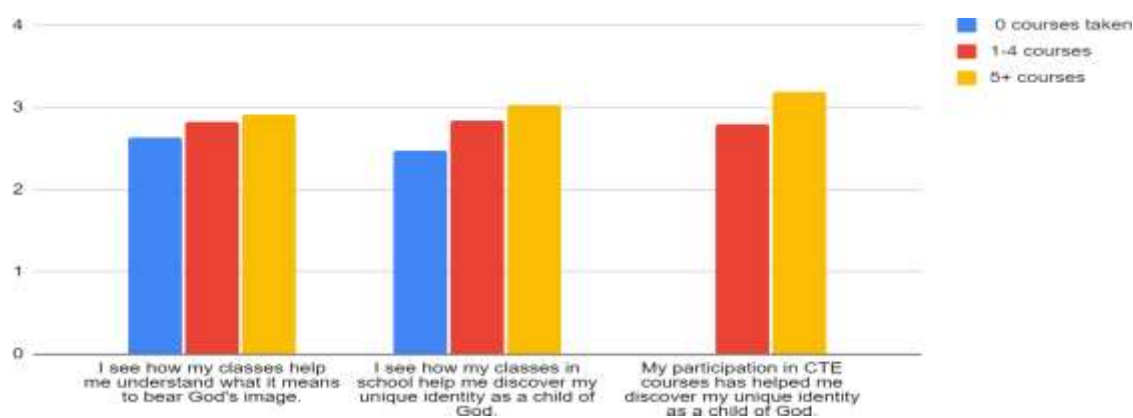
**Figure 7***Mean Scores Comparison: Faith Engagement - CTE*

Table 13 contains the statistical analysis of the data collected from student responses to items dealing with faith formation.



**Table 13***Statistical Impact on Faith Engagement - CTE Participation*

Survey Item	No CTE participation	CTE participation	p- value
I see how my classes help me understand what it means to bear God's image.	2.64	2.84	.0449
I see how my classes in school help me discover my unique identity as a child of God.	2.48	2.86	.0003
My participation in CTE courses has helped me discover my unique identity as a child of God. (Compares level of CTE participation)	2.80 (1-4 courses)	3.19 (5+ courses)	.043

An analysis of the data shows us that although the strength of agreement response is a little lower, participation in CTE courses does in fact lead to a significant statistical difference in this area of faith engagement.

The data show us that participation in dual credit courses has no statistical change on student reported engagement in the area of faith formation. Table 14 contains that statistical analysis

**Table 14***Statistical Impact on Faith Engagement - Dual Credit Participation*

Survey Item	No dual credit	Dual credit	p-value
I see how my classes help me understand what it means to bear God's image.	2.81	2.76	.2415
I see how my classes in school help me discover my unique identity as a child of God.	2.68	2.61	.5347

### Discussion

Affecting change in a learning community is difficult work, which may be made even more difficult when that learning community is already experiencing success. This is further

complicated by the fact that there is a myriad of alternatives for a school to attempt to affect positive change on their community. The data collected in this study showed that participation in CTE education does have a positive effect on student engagement. The purpose of this study was to see if the improvement in engagement would also be seen in smaller Christian schools. A school can then properly predict that increased student engagement can provide a positive impact on the learning community (Diehl, 2020; Geraci, et al., 2017). This research study revealed that CTE participation did have a positive impact on student engagement in the areas of affective engagement (Table 3) and cognitive engagement (Table 7). The impact on behavioral engagement (Table 5) was somewhat more ambiguous. This may be due, in part, to the nature of the communities of students and parents served by these schools. Smaller learning communities allow for a closer connection between teachers and students which students report as a key factor in their engagement (Geraci, et al., 2017).

One of the most interesting things revealed by the study was the fact that participation in dual credit courses did not have a significant statistical impact on student engagement. Only two out of 23 items showed dual credit participation having a significant impact on student engagement. This finding is particularly relevant as dual credit courses are a popular option for meeting the requirements of Perkins V. Although there is nothing inherently negative about offering dual credit courses, and the offering of dual credit courses may serve important functions for a school, it should be noted that they do not improve student engagement (Tables 4, 6, 8, and 14).

Choosing the proper method to deliver a CTE program is another choice that schools must make. This research study did show that the two schools that deliver their CTE program in-house seemed to have more impact on student engagement. Aside from the warning that schools should be intentional about the method they choose, a school should not assume that simply having the option for CTE participation will have a positive impact on student

engagement. Schools should recognize their own responsibility for connecting their students to both their education and their future.

This study also revealed that CTE participation also plays a role in student engagement with their faith formation. The strength of agreement percentages was 11% lower (Table 2) as an average on these survey items, and this seems a bit concerning, but without understanding the nature of each school community's discussion of these faith topics, it would be speculation as to why this is the case. This research study did show that participation in CTE courses had an impact on students' ability to understand their unique abilities and gifts as individuals created in the image of God. This is a significant finding, as one of the most important things a Christian school can do for its students is to help them understand how they can fulfill their unique role in the covenant of vocation that they are members of. Denver Christian School has promised to educate her students in a whole child model. She properly understands that her students are complex and multi-faceted individuals who must be educated in a manner that reflects this. The education of children in this area must be of supreme importance to Christian schools. The understanding that humans derive satisfaction from building things and seeing clearly the value of one's own work is important for everyone's self-worth. Crawford (2010) encouraged his readers to understand that real work that has a real impact on a person's community brings a sense of value to the worker. This idea seems fundamental in the consideration of CTE education for any school, but even more so for a Christian school that seeks to help students understand not only their complexities as humans but also their function as image bearers of God who are about doing real work in God's cosmos that impacts real people. Soloveitchik (2006) further discussed

the nature of this dilemma for anyone who views themselves as belonging in this covenant. The Hebrew tradition makes no attempt to synthesize the creation accounts of Genesis 1 and Genesis 2. Instead, there is an understanding that these accounts live in tension with each other. One account highlighting the importance of relationship and the other stressing the importance of dominion. Denver Christian must educate her students to have dominion in all areas of God's cosmos. Diverse abilities to carry out the flourishing required by the covenant of vocation are championed throughout scripture. Denver Christian must help each student understand their unique gifts and the way in which they honor God and flourish his creation. Ignoring any area is a failure to fulfill both her responsibility to God and her promise to educate the whole child. Denver Christian also educates from a reformed perspective. This too, has an impact on how she should view career and vocational education. A robust picture of common grace and what Abraham Kuyper referred to as the little people means that Denver Christian views all vocations as equally important in the stewardship of God's cosmos (Freire, 2021). Denver Christian must teach students that all gifts can be used and must be celebrated in the attempt to fulfill our individual and collective roles within the covenant of vocation.

### **Recommendations**

While the size of this research study was small, it was intentionally focused on schools that compared closely with Denver Christian High School. Size of school, constituency served, and philosophical vision were all considered. That allows for some recommendations to be made. The fact that the study mirrored the current literature on the subject also lends credence to the following recommendations.

- Denver Christian would be well served to begin to implement a program of CTE courses as part of its curriculum. The addition of these programs will help Denver

Christian meet both its mission and its promise to increase the college and career readiness of its students.

- Denver Christian should take a next step that includes a more thorough investigation into the way different models of CTE implementation work. This should include both a look at the options that are available in-house and the resources that can be met through the public school district.
- Denver Christian should be intentional about how it will establish this program. Simply adding a shop class does not create a CTE program. Denver Christian must determine which standards and goals of CTE fit well within our curriculum and community. These standards must then be woven throughout the curriculum to link the learning of students to their future.
- Denver Christian should conduct some research that attempts to understand the reasons for increased student engagement. Interviewing students, teachers, parents, and administrators from schools that have successful CTE programs would be valuable in determining how to build a program.
- This investigation should include a look at dual credit courses. Denver Christian should continue to offer these courses if they can intentionally design them to help meet the mission of educating students as a whole child.

A quote that is often attributed to C. S. Lewis goes something like this, “I do not remember any one singular meal that my mother cooked, but I can assure you that each one was important for my growth.” Whether or not C. S. Lewis actually said this may be debatable, but there is a truth that Denver Christian can garner from it. It is a thousand seemingly mundane interactions and lessons, all connected to the vision that will really build students and their identity. Students that become adults that are connected to life-long learning that benefits their communities and helps them fulfill their individual and collective roles within the covenant of

vocation.

### **Limitations**

There are some limitations connected to the size of this research study. This survey was limited to 388 students at just three private Christian schools. This sample was just 37% of the student population. A larger sample group and higher response rate would be preferable. It was also limited by the number of schools that participated. Only School 1 had a program that was planned and put in place with intentionality. There are other schools that have added programs within the last decade with this same level of intentionality and planning. Two of those schools have a somewhat unorganized approach to their CTE curriculum. Due to that fact, the results were not able to be broken down into levels of CTE participation. For this reason, the study could not adequately test Diehl's (2020) claim that too much CTE participation causes the participants to disconnect from their school community and become less engaged with their learning.

A final limitation in the size of this study is the fact that it only sought to measure student engagement responses. The scope was very limited. A complete study would also survey staff and administration and might also create a mechanism for determining the reasons behind increased engagement by conducting interviews with students involved.

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## Appendix

### Survey

#### **Demographic information**

1. Which of the following states do you go to school in?  
Nevada          California          Michigan          Minnesota
2. What grade are you currently in?  
9th          10th          11th          12th
3. Do you take any classes for dual credit? (Earning credit toward both high school and college graduation requirements)  
Yes          No
4. How many CTE courses will you take this year?  
0          1-2          3-4          5-6          More than 6
5. How many CTE courses will you/do you plan to complete through the entirety of your high school experience?  
0          1-4          5-8          9-12          More than 12
6. Are you currently taking a course that could be considered CTE?  
Yes          No

#### **Affective Engagement - Liking for learning & School**

1. I think what we are learning in school is fun.  
Strongly disagree          Disagree          Agree          Strongly agree
2. I like what I am learning in school.  
Strongly disagree          Disagree          Agree          Strongly agree
3. I enjoy learning new things in class.  
Strongly disagree          Disagree          Agree          Strongly agree
4. I am proud to be at this school.  
Strongly disagree          Disagree          Agree          Strongly agree
5. Most days, I look forward to coming to school.  
Strongly disagree          Disagree          Agree          Strongly agree
6. I participate in school activities beyond the classroom.  
Strongly disagree          Disagree          Agree          Strongly agree
7. My participation in CTE courses has increased my enjoyment of school.  
Strongly disagree          Disagree          Agree          Strongly agree
8. I enjoy good relationships with my teachers  
Strongly disagree          Disagree          Agree          Strongly agree
9. I enjoy good relationships with my CTE course teachers.  
Strongly disagree          Disagree          Agree          Strongly agree
10. I enjoy good relationships with my peers at school.  
Strongly disagree          Disagree          Agree          Strongly agree

**Behavioral Engagement- Persistence in Learning**

1. In class, I work as hard as I can.  
Strongly disagree      Disagree      Agree      Strongly agree
2. When I'm in class, I participate by engaging in discussions, asking questions, and helping in group work.  
Strongly disagree      Disagree      Agree      Strongly agree
3. I pay attention in class.  
Strongly disagree      Disagree      Agree      Strongly agree
4. In school, I do just enough to get by.  
Strongly disagree      Disagree      Agree      Strongly agree
5. When I run into a difficult homework problem, I keep working until I think I have solved it.  
Strongly disagree      Disagree      Agree      Strongly agree

**Cognitive Engagement**

1. When I study, I try to understand the material better by relating it to things I already know.  
Strongly disagree      Disagree      Agree      Strongly agree
2. When I study, I try to figure out how the information might be useful in the real world.  
Strongly disagree      Disagree      Agree      Strongly agree
3. I see how my classes in school help me discover my unique identity as a child of God.  
Strongly disagree      Disagree      Agree      Strongly agree
4. I can connect the things I am learning to my future in college or the workforce.  
Strongly disagree      Disagree      Agree      Strongly agree
5. My participation in CTE courses has allowed me to become a better student in school.  
Strongly disagree      Disagree      Agree      Strongly agree
6. I see how my classes help me understand what it means to bear God's image.
7. When studying, I try to combine different pieces of information from course material in new ways.  
Strongly disagree      Disagree      Agree      Strongly agree
8. I try to match what I already know with things that I am trying to learn for school.  
Strongly disagree      Disagree      Agree      Strongly agree
9. My participation in CTE courses has helped me discover my unique identity as a child of God.  
Strongly disagree      Disagree      Agree      Strongly agree