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ACADEMIC SUCCESS IN CAREER TECHNICAL SCHOOLS FOR STUDENTS WHO HAVE AN IEP/504

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SHAWNEE STATE UNIVERSITY

**ACADEMIC SUCCESS IN CAREER TECHNICAL SCHOOLS FOR STUDENTS
WHO HAVE AN IEP/504**

A Thesis

By

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Submitted in partial fulfillment of the requirements

for the degree of

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 7/29/2022

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The thesis entitled **ACADEMIC SUCCESS IN CAREER TECHNICAL SCHOOLS
FOR STUDENTS WHO HAVE AN IEP/504**

presented by **Bryan M Ropp**, a candidate for the degree of **Master of Science in
Mathematics**, has been approved and is worthy of acceptance.

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ABSTRACT

This study examines the interaction of career technical education and traditional school education and the impact each school type has on students with disabilities. Each school type is being measured on academic performance on ACT Scores taken during the student's senior year and using Ohio End-of-Course Exams scores as a baseline that are taken during the student's sophomore year. A multiple regression analysis was conducted to see what the best predictor of ACT Scores was using End-of-Course Exams scores, school type, gender, IEP, 504, and free-reduced lunch status as predictors. The study takes place in Greene County, Ohio where students attend their junior and senior years of High School. The curriculum in both school types is the same, it is only the environment that is different. The population of students with disabilities within Career Technical centers is growing and the graduation rate for this population is 67% nationwide. The combination of these two factors brings added concern to the issue and provides the motive for this study. Career Technical Schools provide more opportunities to meet the requirements of the alternative pathway necessary for graduation and is the leading cause for the increased population of students with disabilities. Therefore, this study measures the impact of career technical school environments and whether that leads to better academic scores with the assumption that the student's social and emotional needs are being met as they are grouped with students that have similar career interests. Further investigation between the school types was taken in measuring college credits earned by students with disabilities and to see if there is a statistically significant mean difference in college credits earned between each school type. To measure this a two-sample t-test was run. The results found that students who attended a career technical school performed 1.26 points higher on their ACT than

students who attended a traditional school. School type was found to be a significant predictor of ACT at the 0.01 level. Further results were found that End-of-Course scores (at 0.001 level) and whether a student was on an IEP or a 504(at the 0.01 level) are significant predictors of ACT Scores as well. Testing the mean difference of college credits earned across school type was statistically significant at the 0.001 level which showed career technical schools to have more students with disabilities earning college credits in High School. These results came from a convenience sample in Greene County, Ohio, and provide insight into how career environments have positive impacts on academic performances.

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Chapter 1 Introduction

Chapter one will introduce why it is necessary to study the relationship between the success of students with disabilities and the type of school that those students attend. Within this chapter, it will be explained how the background of the problem leads to the primary research questions that will be studied and then proceed to define my research design that will answer the research questions. By the end of chapter one, you will have a firm understanding of the background of the problem, research problem, research questions, research design, and the theoretical framework behind the study that can give support into needing to improve our education system for students with disabilities today.

Background of the Problem

The increasing demand for trade jobs has made Career Technical Schools more popular and has put pressure on them to produce employable students to reach the current demand. There is also an increase in the overall population of students with disabilities in CTE Schools, so we must re-evaluate the academic success of students who attend a CTE school versus a traditional school. The growing concern is that CTE Schools are being flooded with students with disabilities and the teacher-to-student with disabilities ratio is lower in comparison to traditional schools. This brings to question the academic success of students who are on an IEP who attend CTE Schools. Trying to measure academic success with students with disabilities there are other variables to consider, such as students are more highly motivated to succeed in CTE Schools as the engagement of the child is stronger as they are participating in a field that interests them for half the day. So again, one must wonder if that increased engagement transfers over to academic success

as well even though students spend less time in academics than they would if they remained at a traditional school. In terms of time and teacher-student ratio it seems that CTE Schools are at a disadvantage compared to traditional schools, but measuring academic success has a fundamental root in student engagement. This is hard to measure statistically speaking, but I attend to do so by using two different environments with students in a CTE Schools and students that are in a traditional school. Students have a choice whether they want to attend a CTE School or not, so students are engaged when they come to the CTE School initially.

The transformation of Career Technical Education is constantly evolving to meet the economic needs. Previous research studies found that “State legislatures passed 85 CTE-related bills, only five of which were vetoed, in 2018—more than any other education issue besides teaching. That is up from 42 CTE bills in 2016 and 61 in 2017” (Malkus,2019). The increase in demand has led to also an increase in student enrollment in Career Technical Education throughout the United States. An article by The James G Martin Center for Academic Renewal stated, “In 1999, only 9.6 million students were in a trade school, but by 2014, this number increased to 16 million, according to the National Center for Education Statistics” (Zogby, 2020). In the past, CTE schools were known as Vocational Schools and have been widely documented as to what some call a dumping ground for underperforming students. So has the change in titles from Vocational School to CTE changed the perspective that it is still a dumping ground for underperforming students? If a student is underperforming in the traditional school, do they still underperform at the CTE School? I believe that this transition to CTE Schools and the push for trade jobs in America has changed the perspective that CTE Schools is

no longer a dumping ground for underperforming students, but instead is where underperforming students go to thrive, and they are more engaged and have found a new purpose for themselves in their educational track. I speculate that the underlying principle that measures students' academic success, especially students who are on an IEP/504, will be the engagement of the student.

“Advocates such as the Association for Career and Technical Education have trumpeted promising statistics about CTE’s ability to increase graduation rates, academic motivation, course-taking, and earnings, to name a few. After a successful rebranding, CTE has substantially shed the negative connotations of vocational education” (Malkus,2019). A recent survey showed that “81% of high school dropouts state that the teaching of real-world skills would have kept them in school” (Anthony, 2021). Allowing students to drop out because we don’t have any alternatives for them to learn is going against the morals and ethics of No Child Left Behind. There must be an answer for those students, and I believe the answer is within the culture of a school system that allows the opportunity for all to flourish. The content needs to inspire students to want to learn and to grab their attention. Professor Jacob from the University of Michigan states that “CTE can motivate students to attend school more frequently and be more engaged, and therefore improve core academic skills” (Jacob,2017). This proclamation by Professor Jacob needs to be tested to see if it is true; especially for students with disabilities since there seems to be an overwhelming interest from that population in CTE.

To have a broad understanding of how Career Technical Education (CTE) Schools impact students who are on an IEP/504, let’s take a step back and look at the transformation of CTE schools over the past century to bring more light to why we see

such large populations of IEP/504 students in CTE. In the beginning, CTE first started off being known as a Vocational School when the Smith-Hughes Act was passed in 1917. The combination of the Vocational Act of 1963 and the Individuals with Disabilities Act in 1975 created a funneling effect for students with disabilities in that they would go to Vocational Schools. Then came the push from the Reagan administration in the early 1980s that American Education is falling behind and that it needs to become more rigorous. So, there was a large IEP/504 population increase in Vocational Schools as the demand for college education was on the rise. In support of this Nate Malkus who has a Ph.D. in Education Policy states, “In the late 1980s and into the 1990s, vocational education came under increased scrutiny for the populations it “served” and whether it actually served them” (Malkus, 2019). This increase continued past the 1990’s and into today as Jinghong Cai and Senior Research Analyst at the National School Boards Association states, “the number of IDEA students who enrolled in CTE at the secondary level increased by 73 percent from less than 500,000 in 2008 to more than 800,000 in 2018” (Cai, 2019). Vocational Education needed to be rebranded and that all started with the 1990’s Perkins Amendments. With the Perkins IV Amendment the term Vocational Education was changed to Career Technical Education and with that brought the push for this study. Career Technical Education is not designed to be a place where students who are on an IEP/504 go to end their academic careers, but a place where they can flourish and continue towards post-secondary education or deliver on the high demand of career technical jobs of today.

Statement of the Problem

In previous studies, there have been attempts to compare career technical schools versus traditional schools, but none tried to compare the academic performance of students who are on an IEP or 504 plan. This is troubling since there is a large population of students with disabilities that attend a Career Technical Center. Let's bridge the gap with more concrete evidence that students thrive better academically. Previous studies have already shown that the graduation rates are better, but that isn't a consistent measurement of academic performance as there are many alternative paths to graduation that a Career Center has that traditional schools don't have. If a student doesn't earn the required graduation points from the state tests to graduate, they can still graduate by "demonstrating competency and readiness for a job, college, military, or a self-sustaining profession" (Ohio Department of Education, 2019). So, there is an underlying issue of funneling students with disabilities to a Career Technical Center but there is no proof that they perform better academically other than that they have higher graduation and attendance rates. Again, the need to bridge the gap in understanding that students who are on an IEP perform better academically at a Career Technical Center needs to be clarified.

Purpose of the Study

The purpose of this quantitative study is to find a relationship between students' academic success based on whether they attend a CTE school or a traditional school, putting particular emphasis on students who are on an IEP/504. This study will help in identifying how education should adapt to teaching students with disabilities based on the results of this study.

This study will take place in Greene County Ohio. It will use data from the Greene County Career Center and all the High Schools from Greene County which are

Greenview, Cedarville, Bellbrook, Xenia, Yellow Springs, Fairborn, and Beavercreek.

The study will be comparing academic results from students with disabilities from each district to see if there is any correlation of better academic success using common playing field assessments such as state end-of-course exams and ACT scores.

The independent variables are student's gender, IEP or 504, social-economic status, school district, and end-of-course exam scores. The end-of-course exam scores will be an important set of data as it will be a primary baseline for a student's academic performance in their sophomore year which is the year before they decide to move to career technical education. The student's ACT Scores as a Senior are my dependent variable to see if there is any increase in academic performance with students with disabilities in a career technical school.

Significance of the Study

This should send implications on how content needs to be changed for students with disabilities for grades 10 and under and encourage further research to decide what would be best for students with disabilities. Whether a student would be more successful in direct instruction, project-based, teacher-centered, student-centered, inquiry-based learning, flipped classroom, content-focused methods, etc. Schools should be able to offer multiple formats to reach students' needs based on what works best for them. Waiting until eleventh grade to give them content that interests them and delivering instruction that is best for them is way too late and needs to be implemented sooner.

Research Questions

To begin the study, are gender, sophomore end of course exam scores, type of school, socioeconomic status, and support services type (504 or IEP) predictive of ACT

Scores? Is there a statistically significant difference in mean CCP credits earned by students with disabilities across school type?

Research Design

This research design is exploratory as it will be trying to find predictors of student success that will be measured by ACT scores of all students in Greene County, Ohio as my dependent variable. The sophomore End of Course Exam will serve as my baseline data as students pick their path as a Junior to stay in the Traditional School or change to Career Technical Education. The categorical variables will be gender, socioeconomic status, and IEP/504 to see if there is any correlation between the categorical variables in their success at either school.

The data will be collected from Beavercreek City Schools, Fairborn City Schools, Yellow Springs City Schools, Bellbrook City Schools, Xenia City Schools, Cedarville City Schools, and the Greene County Career Center. Once this data is collected a multiple regression analysis using backward elimination will be used to find the best model to predict ACT scores, while also running a two-sample test to see if there is a difference in mean CCP credits earned by students with disabilities across school type.

Theoretical Framework

The theoretical framework of the study is to see if students' social-emotional needs are being met at a Career Technical School which in return changes their performance on an academic level. Using the ACT to measure their performance will be a common measurement between each school and will strictly be a measure of student engagement. The content that is on the ACT is being taught traditionally with direct instruction and project-based learning in all the districts. The only difference is that in a Career Technical

school they get to spend a half-day in a lab of their choice and therefore spend less time in their academics. But they also get to spend more time engaging with other students with similar interests and their social-emotional needs are being met. If the common ACT score measurement shows to be better off for Career Technical schools, it can be explained by the fact that they get to spend part of their educational day doing something that engages their interest not because the Career Technical Center has different teaching tactics when it comes to the core academics. With less academic time and a larger number of students with disabilities in a Career Technical Center, there is a higher student-teacher ratio when looking at students with disabilities which is a disadvantage for a Career Technical Center in preparation for the ACT with the group of students with disabilities.

Pending the results of the study which is truly measuring a student's academic performance based on their social-emotional needs being met, it should open the door that education needs to be adaptive to the student and not the other way around. School systems should make a considerable effort to provide multiple formats of teaching to meet the social-emotional needs of students rather than the traditional direct instruction and more importantly have content that supports student engagement.

Assumptions and Limitations

Using the ACT Score as a dependent variable is great in the sense that it is the only primary common measurement between the traditional and career technical schools, but by the state of Ohio requiring every student to take the ACT also means that students that have no intention of going to college will be taking it. So, leading up to this study it will be taken into account some outlier data of those students who didn't attempt any

questions on the test and assume that the other students that took the ACT performed to their best abilities.

Another limitation that must be considered is that this current Senior class will be the first time they had a full year of in-person learning after a year and a half of virtual learning due to a pandemic. This study will be focusing on the graduating class of 2022 only as it would be biased to compare multiple years due to the pandemic.

Definition of Terms

ACT- “ACT (American College Testing) is a standardized test used for college admissions in the United States. It is currently administered by ACT, a nonprofit organization of the same name. The ACT test covers four academic skill areas: English, mathematics, reading, and scientific reasoning. It also offers an optional direct writing test. It is accepted by all four-year colleges and universities in the United States as well as more than 225 universities outside of the U.S. The main four ACT test sections are individually scored on a scale of 1–36, and a composite score (the rounded whole number average of the four sections) is provided” (Wikipedia, 2021).

End of Course Exam- “The Ohio State End-of-Course Exams (EOC) are Ohio's State achievement tests for selected high school courses and are connected to Ohio's graduation requirement pathways. For classes 2018 through 2022: Students in these graduation cohorts take seven Ohio State End-of-Course Exams (EOC) (Algebra I, Geometry, English Language Arts I, English Language Arts II, American History, American Government, and Biology). These end-of-course exams are typically taken in the Spring of the year they take each of the courses associated with the EOC exams. On each EOC,

students earn 1-5 graduation points. Students have the potential to earn 35 points across the 7 EOCs. To meet this graduation pathway, students must earn a minimum of 18 points from the seven tests with the following content area minimums as well (four points or more across the two ELA tests, four points or more across the two Mathematics tests, and six points or more across the Science and Social Studies tests)”(CPS Testing & Assessment, 2021).

Career Technical Schools- “Career and technical education (CTE) provides an important pathway to success for high school students and offers each student opportunities to personalize his or her education based on their career interests and unique learning needs. CTE refers to courses and programs designed to prepare students for careers in current or emerging professions” (CTE, 2019).

Traditional Schools- “Traditional schools as teacher-centered delivery of instruction to students with a focus on having students master academic core subjects, including math, reading, writing, science, and social studies” (Miller, 2019).

Academic Success- Academic success will be determined by the highest growth from Sophomore End of Course Testing to Senior ACT Testing or Senior End of Course Testing.

Students with Disabilities- Students that are on an IEP/504 plan

IEP- “The Individualized Educational Plan (IEP) is a plan or program developed to ensure that a child who has a disability identified under the law and is attending an elementary or secondary educational institution receives specialized instruction and related services” (DO-IT, 2021).

504 Plan- “The 504 Plan is a plan developed to ensure that a child who has a disability identified under the law and is attending an elementary or secondary educational institution receives accommodations that will ensure their academic success and access to the learning environment” (DO-IT, 2021).

IDEA- Individuals with Disabilities Education Act

Summary

Chapter one introduced the problem statement to be investigated as there is no current research that measures the academic performance of students with disabilities in a CTE School versus a traditional school as in recent years the overall population in CTE schools is increasing. Originally there was a larger portion of students with disabilities in a CTE schools as there was a huge push for more rigorous courses at the traditional schools as making more students college bound was a major focus. But in recent years we have seen a shift to preparing students to enter a trade and career right after High School so the increase in numbers is now a combination of both preparing for career ready as trade jobs are in high demand right now. A lot of the Careers that are in demand right now require a college certificate or degree, so college readiness is not solely put upon the traditional schools but the CTE Schools as well. The change in these dynamics brings into question the academic success rates for each type of school. So, over the next several chapters I plan to discuss the literature review of similar studies that have tried to compare CTE Schools and traditional schools. My methodology in how I plan to answer my research questions to solve my problem of unknown academic success of students with disabilities across school type. I will then conclude with the testing that I performed and report the

results that I have found in comparing the traditional schools and career technical schools in Greene County, Ohio.

Chapter 2 Literature Review

The moral compass of this research is to gain further understanding of the academic success of an IEP/504 student. Enrollment of students with disabilities has always been higher at CTE school versus a traditional school, but now we are seeing more of an increase because of the new paths to graduation for the graduating class of 2021-2022. Along with graduation requirements evolving so are the schools and offering different models from which students and parents can choose. In addition to CTE Schools “Ohio families can choose from traditional public schools, public charter schools, public magnet schools, private schools, online academies, homeschooling, and learning pods” (National School Choice Week, 2022).

The growing need for educational reform is a telling sign of the need to provide education that engages, supports, and enriches a variety of students and their learning needs. If a student isn't getting the support or proper learning environment that sets them up for success, they become disengaged and lose interest in learning which happens frequently in all facets of education as a child's needs and interests are constantly changing. Children are constantly exploring and trying to find what they are good at and what they like or dislike. Children also learn in different ways and over the course of a student's educational path through High School every student can change how he/she learns different topics. Is a child supposed to switch what type of school he/she attends as their needs change? CTE Schools are the closest to allowing this to happen for a student

as they get to choose what career interests them and then be assigned a lab and academic schedule that will support them in getting hired into that career. If their interests change, then their course schedule will change to accommodate that. The push for education reform is obvious with the development of multiple different types of schools that students can now attend, but with most of the population of students attending traditional school, there can be a further push on traditional schools to become more adaptive to students' needs and learning.

CTE Schools in Greene County, Ohio only attend their Junior and Senior years of High School so that leaves the rest of their school years in a school where they have to adapt to the school and not the other way around. With Career Technical schools being unique in that way it is important to measure their academic success as in comparison to all the potential other forms of schools students are engaged in a lab of interest and does that transfer over to better academic results? The studies of better GPA's are bias in that the scale is different for each school type and the studies dealing with graduation rates is biased in that there are alternative pathways to graduation for Career Technical Schools. If a student doesn't meet the requirements on the Ohio State Tests or the ACT/SAT, then they can meet the "Industry credential and workforce readiness by earning a minimum of 12 points by receiving a State Board of Education-approved, industry-recognized credential or group of credentials in a single career field and earn the required score on WorkKeys, a work-readiness test. The state of Ohio will pay one time for you to take the WorkKeys test" (Ohio Graduation Requirements, 2019). Lastly, students can also graduate showing competency by either completing one of the three options: "Option 1, Demonstrate Two Career-Focused Activities: Foundational Proficient scores on

WebXams A 12-point industry credential A pre-apprenticeship or acceptance into an approved apprenticeship program Supporting Work-based learning Earn the required score on WorkKeys Earn the OhioMeansJobs Readiness Seal. Option 2, Enlist in the Military Show evidence that you have signed a contract to enter a branch of the U.S. armed services upon graduation. Option 3, Complete College Coursework Earn credit for one college-level math and/ or college-level English course through Ohio's free College Credit Plus program"(Ohio Graduation Requirements, 2019). If you meet one of those three options and show readiness by earning "two of the following diploma seals, choosing those that line up with your goals and interests. These seals give you the chance to demonstrate academic, technical, and professional skills and knowledge that align to your passions, interests and planned next steps after high school. At least one of the two must be Ohio-designed: OhioMeansJobs Readiness Seal (Ohio), Industry-Recognized Credential Seal (Ohio), College-Ready Seal (Ohio), Military Enlistment Seal (Ohio), Citizenship Seal (Ohio), Science Seal (Ohio), Honors Diploma Seal (Ohio), Seal of Biliteracy (Ohio), Technology Seal (Ohio), Community Service Seal (Local), Fine and Performing Arts Seal (Local), Student Engagement Seal (Local)"(Ohio Graduation Requirements, 2019). With these new graduation requirements, it is obvious to see that Career Technical schools are the best option for students to graduate if they don't make the minimum scores on the Ohio State Tests or the ACT/SAT. It also goes to show that there is a growing rate of students who are not meeting the benchmark requirements on their testing to graduate in the State of Ohio.

In this literature review, there will be supportive detail about the growing population of students with disabilities that are attending Career Technical Education,

how there is a lack of engagement in schools today, the current school types that are offered and the educational reforms that are happening to combat the student population of today, the academic success being shown at Career Technical Schools and the gaps in previous studies, the push for college credit plus in Career Technical Education and the success of the courses in comparison to traditional schools.

As outlined in Chapter 1 the main reason that there is a high population of students with disabilities in Career Technical Education is because of the new graduation requirements that are set by the state of Ohio. The new alternative pathways to graduation in which students have to show competency in career-related fields can only be accomplished at a Career Technical School and can be a funneling ground for students that are not meeting state standardized tests scores or scores on their ACT/SAT. The larger portion of those types of students happen to be students with disabilities as the education system today, unfortunately, tracks these students into special education classrooms only in which there are lower academic standards. This is the root cause of why our graduation rates are lower for students with disabilities compared to any other demographic. “The National Longitudinal Transition Study 2 (2005b) interviewed and surveyed more than 8,000 youth with disabilities across the nation and found that 68% of students with disabilities had participated in some type of vocational education program while in high school” (Schmalzried, 2010). The population of students with disabilities in a Career Technical Center is a telling sign that these students require the career readiness seal for graduation requirements, or they just are craving for a change in education that appeals to their interests. In either case, the amount of students with disabilities is the root of the issue and that tracking is still taking place just to appease graduation requirements,

not enough consideration is taking place in today's education system in making sure students with disabilities are progressing to meet at grade level requirements. "Recent federal data show that the public high school graduation rate nationwide is 85 percent, the highest it has been since the rate was first measured in 2011. However, in both 2017 and 2018, the national average graduation rate of students with disabilities who participated in CTE reached 89 percent, only 6 percentage points below the national average graduation rate of all CTE students" (Center of Public Education, 2019). Results like this don't convey whether students with disabilities are improving academically but the fact that the graduation requirement bar can be moved and manipulated for these students and the real problem of not providing enough support and engaging material for these students to perform at the same academic level is overshadowed and there needs to be more studies that measure students' academic progress from different academic practices. These studies are a necessity for solving the real problem of why the real national average graduation rate of students who are on an IEP is far less. In continuation of this problem of graduation rates of students that are on an IEP, let's further examine some underlying issues that cause the low graduation rates and that is student engagement.

The lack of engagement can be found across the United States as "the number of students with disabilities who graduated from high school in 2010-2011 was 59% and growing to 64.6% in 2014-2015"(Maciag, 2021). In comparison to all students, "the number of high school students who graduated from High School in 2010-2011 was 79% and growing to 83.2% in 2014-2015" (Maciag, 2021). Moving up to the year 2021 "the number of high school students who graduated from High School was 85.3% and the number of high school students with disabilities graduated High School 67.1% of the

time” (ThinkImpact, 2021). It may seem plausible to just funnel as many students as possible into Career Technical Education so that the national average can improve and thus give false implications that the problem is solved. You have to question whether the students are performing better because of their engagement or is it because of the alternative pathways that are available for them to graduate. It is great to see that the graduation rates are increasing but there is a large need for improvement in working with students with disabilities and for them to meet High School graduation requirements. As mentioned previously the bar for graduation is constantly changing as well, so to see if students are actually performing better academically using the High School graduation rates as an indicator will be biased as that is different for every state.

The lack of engagement in schools today causes students to drop out. In a study done in 2006 about when and why students drop out it was found that “across all students, ninth graders have the highest dropout rate. Ninth graders and students aged 16 and younger are more likely than advanced and older students to leave school for disciplinary reasons” (Stearns & Glennie, 2006). The lack of engagement is happening before High School, and it needs to be recognized that we need to grasp a student’s intrinsic motivation to learn from a very early age or it progresses to the point where they do drop out as they don’t have the motivation to move forward with their education. Capturing the engagement of a student is a non-debated topic and is an easily agreed-upon notion that must take place in education, so why in the year 2021 do we have only approximately two-thirds of our students with disabilities graduating high school? The education system is failing to reach one-third of the students with disabilities.

An article written by Weihua Fan and Christopher A Wolters about a student's motivation to learn and high school dropouts, confirms and talks about how important intrinsic motivation and self-efficacy are to a student in their education to learn. But the most important part from the article that translates here is that "Prior research indicates that students' ability beliefs are linked to their educational expectations (e.g., Bandura, Barbaranelli, Caprara & Pastorelli, 2001; Rottinghaus, Lindley, Green & Borgen, 2002; Tang, Pan & Newmeyer, 2008; Trusty, 2000). For example, Bandura et al. (2001) conducted a longitudinal study to examine a structural model of social cognitive influences that shape students' educational expectations and career trajectories. Their results revealed that students' academic expectations were positively linked to their ability belief and were also a key determinant of their preferred choice of career" (Fan & Walters, 2014).

With the drop-out rate being higher for students with disabilities compared to all students the education system has to do a better job engaging these students and giving them self-efficacy in the early stages of their educational career and having academic expectations that link to their preferred choice of a career. Education today gives students opportunities to take academic content that relates to their career at Career Technical Centers, but it is far too late for most of the students with disabilities as it applies to the High School level pending on the State and the County in which the student resides. It is understandable that students at younger ages will ultimately change their viewpoints on what career they want to do as they get older, but the point is that they are being engaged at an early level and the content that is being taught should have the context of different

career fields. The push for education reform is already underway as there are multiple different variations of schools that students can now attend.

Education reform is needed in the realm of special education because as a country we are not meeting the needs of students with disabilities. Some may suggest that there are many alternatives to the traditional school track that students with disabilities could attend instead. Let's take a look at each school type and digest the current challenges that American families have in attending another school type.

The first school type is Charter Schools. "Charter schools have been allowed in Ohio since 1997" (National School Choice Week, 2022). These schools are a tuition-free option for students and each charter school chooses "a specialization or mission statement that meets a need of their community" (Flavin, 2016). Even though the enrollment is free the space is limited and students are most likely to get selected by a lottery system. The result is that it could be a great option for students with disabilities depending on the mission statement that the parents may or may not agree with, but the end result is that the proportional number of students with disabilities attend charter schools as they do public schools. The academic results are no different either as "Stephen Dyer, director of government relations, communications, and marketing for the Ohio Education Association, cited state graduation rates showing that 94% of traditional public school students earned a diploma, compared to 64% of charter students. And, more than a third of traditional public school graduates earn a college degree within 6 years of graduation compared to only 12% of charter students" (Candisky, 2020).

Another valuable option for students with disabilities is a private school that specializes in their disability, but the obvious issue here is cost. Even though there are

scholarships available to make this a valuable option for families there is not enough money to go around to reach the vast majority of students and for financial reasons, this is not a valuable option. To consider virtual options you would have to be a student who is in need of very little support and the vast majority of students with disability need a great support system to be successful so those are not the best option either for students with disabilities. If you consider learning pods or homeschooling students with disabilities would have a great support system and flexibility to teach to their strengths and interests, but the vast majority of parents don't have the ability to homeschool either because of work-related schedules or not feeling qualified to teach all the necessary content. In short, the list of possible school types thus far seems to be lacking in some way to be able to reach the vast majority of students with disabilities and is one of the leading reasons that our graduation rates for students with disabilities are so low and why students with disabilities are not meeting the academic standards that are being set by the state. There is one additional type of school that has generated some promising academic results and teaches to student's career interests similar to Career Technical Education, but just to younger ages and those are called Magnet Schools.

“Magnet schools are free public schools. They allow kids to zoom in on a specific learning track, such as engineering or the performing arts. At a magnet school, all the subjects are taught through the lenses of that specific track” (National School Choice Week, 2022). Magnet schools are not separate institutions like charter and private schools, but they coexist with a current traditional public school. Walden University describes Magnet Schools as schools that “utilize a hands-on, centralized approach to providing students with a robust learning experience in areas that capitalize on their

strengths and interests. Children in magnet programs still learn the basic curricula that regular school programs provide, but those basics are enhanced by the special teaching techniques and more personalized settings of magnet schools” (Walden University, 2021). The magnet schools are more popular in the larger city schools and there are different variations of them as well. Some have a random lottery acceptance, while others have an application, and admittance is determined on GPA and test scores, while some public schools accept all of their students into the magnet school. The limitations of these schools is their availability to all students, but the academic success of these schools are being well monitored and one of the highlights can be found in a book called *The Wiley Handbook of School of Choice* edited by Nina Buchanan and Robert Fox and in Chapter 11 written by Jia Wang and Joan Herman they mention the following study results:

In a study of lottery-based magnet schools in an unnamed Southern city, Ballou (2007) found strong positive effects on magnet school participation in academic achievement across subject areas. In a similar study of lottery-based magnet schools in New York City, Crain, Heebner, and Si(1992) found magnet participation to have a significantly positive impact on reading scores and credits earned toward graduation. In another lottery-based study in San Diego, Betts et al. (2006) found a significant effect on math achievement in the second and third years of magnet implementation. In two linked multi-site studies of magnet schools in nine cities throughout the country, magnet participation was found to have numerous positive effects on low-achieving students (such as better attendance and lower drop-out rates) (Kemple & Snipes, 2000; Kemple & Scott-Clayton, 2004). In a more recent lottery-based study in Connecticut, a similar

positive effect was found in math and reading achievement as a result of magnet school attendance, with magnet schools showing particularly significant impact on outcomes for several subgroups: Hispanics, free/reduced lunch recipients, and special education students (Bifulco et al., 2009) (Herman & Wang, 2017, Pg. 165).

The results can't be overlooked as there are multiple studies here confirming academic success with all types of demographics but the major demographic that our country is trying to improve on are the students with disabilities and low achieving students who are more likely to not graduate High School. The study conducted by Bifulco "was rated by the What Works Clearing House as meeting the design standards without reservations, the highest possible rating" (Herman & Wang, 2017). It is unfortunate that these schools are not very popular outside of urban areas and fail to reach the majority of the population. Perhaps there is something to learn from Magnet Schools and that teaching to a student's interest and capturing their engagement or intrinsic motivation to want to learn at an early age is the most important job of an educational institution.

The current state of educational reform when it comes to students with disabilities I feel is best demonstrated by Nate Levenson "who is at s District Management Group, a consulting firm that helps schools and districts raise achievement, manage scarce resources, and deal with challenges like improving special education" (Levenson, 2020). He talks about how the first phase of educational reform for students with disabilities is the Individual with Disabilities Education Act (IDEA) which granted students with disabilities a free and appropriate education. Then the second phase is the day after that bill was signed into action and how education has failed to provide the appropriate

education needed. Levenson further explains why we have failed to provide appropriate education as “far too few students with disabilities read on grade level, master math, or graduate from college. These disappointing results are doubly depressing given that so many caring teachers work hard to help and that districts are spending even more, even as budgets tighten” So now we are in phase three which to paraphrase is that education today needs to put more students who have disabilities in the general education track, give them more time to learn the material, and to give them highly qualified instructors with special educational backgrounds to teach them. The general consensus is that the current education tends to isolate students who have disabilities from the general track and teach them lower content standards. In order for education to meet special education, it needs to not be misconstrued that disabilities don’t mean inability. Students with disabilities need more time, need to be integrated with the general track of education, and be provided in-classroom support because coming back full circle the underlying root of a student’s success is their engagement. Educational content has to grasp the student’s desires to learn so that they have the intrinsic motivation to persist with their education. If given more time, proper support, and meaningful content students with disabilities can be successful and mainstreamed with the general track. The academic success of students in Magnet Schools and Career Technical Schools is widely debated and depending on the source you have different results. Both schools have found academic success but have gaps in their studies.

The previously quoted lottery-based studies on Magnet Schools show promising results for students with disabilities and “it is noteworthy that lottery studies have shown overwhelming positive results on student outcomes including test scores, attendance,

graduation rates. These lottery studies are usually deemed to be rigorous” (Herman & Wang, 2017). But there are studies on Magnet Schools that don’t have the same results. The population taken into consideration plays a large role in studies of Magnet Schools as they can vary and therefore “the vast number of magnet studies fall in the middle of these two extremes, particularly for quasi-experimental studies using rigorous design and statistical controls to examine effects. These latter studies show mixed results” (Herman & Wang, 2017). While it is affirming that the lottery-based and descriptive studies are showing positive results, the quasi-experimental studies are showing mixed results. This goes to show that there are some gaps, particularly in the variety of populations in the studies of Magnet schools. More focus studies on students with disabilities are needed. While Magnet Schools focus on younger students, Career Technical Schools focus on the High School students and the success and gaps are similar in the lack of focus on students with disabilities.

Currently, there are several research topics that have tried to compare career technical schools versus traditional schools in terms of their graduation rates, wages of graduates, and attendance. The first relevant study that I want to mention was done by a California Dropout Research Project done in 2007. In this report, they wanted to test if combining career technical education with academic education would improve overall High School graduation rates. This study makes a valid point about previous studies in that “most of the research does not support strong inferences about cause and effect” (Clark, Dayton, Stern, Tidyman, & Weisberg, 2007). This research report is intriguing as it tried to test their assumptions using reliable data such as high school transcript data from national surveys, a study on academically 9 enriched career-technical education,

using random assignment at the classroom level, and research on High Schools That Work.

In 2005 there was an experimental study that “focused on individual career-technical classes as settings in which to improve students’ performance in one academic subject, namely, mathematics. A total of 134 career-technical teachers took part in the study: 60 were randomly assigned to the experimental group, and the remaining 74 were the control group” (Stone, Alfeld, Pearson, Lewis, & Jensen, 2005). This study is a convincing study that teaching academic content that relates to a child’s interest or field that he/she is interested in has positive effects academically. The key to this study is that teachers had to change the way that they teach and make the content relatable to students’ fields of interest. Although the study didn’t involve special education students the results were clear cut, “After one year, students in the experimental classrooms scored significantly higher on TerraNova and Accuplacer math tests” (Stone, Alfeld, Pearson, Lewis, & Jensen, 2005).

Another study involved the effectiveness of High School that Work. “HSTW is probably the biggest high school reform network in the country and is certainly the largest initiative aiming to combine academic with career-technical education” (Clark, Dayton, Stern, Tidyman, & Weisberg, 2007). The actual study was performed by Bottoms, Han, and Presson, “They used 2002 and 2004 data from schools that tested all seniors or a random sample of all seniors, thus obviating concerns about whether the kinds of students selected for testing might have changed over time. The study also compared two sets of schools, 50 HSTW schools that received extra support, and 50 HSTW schools that did not. The schools that received this extra support showed

statistically significant gains in students' mean scores in math and science, while the non-supported schools did not" (Bottoms, Han, & Presson, 2007). This again brings to light that using a larger sampling size that combining Career Technical Education to the curriculum improves academic scores. This study sample size is much larger than Pearson, Lewis, and Jensen in which it produced statistical significance in students' math and science scores. Similar to the Pearson, Lewis, & Jensen there is no focus on students that are on an IEP/504 and measuring the gains of those students.

The transcript data from national surveys had findings that "students who combined a sufficient number of courses to qualify for college with a sequence of career-technical courses had more success in postsecondary education and work than students who completed neither the college-prep nor the career-tech sequence" (Stern & Stearns, 2007). This conclusion is a good start in showing that there is a correlation between career technical education and college credit plus classes in High School that better prepares students for success beyond High School but leaves out the growth in students who took the career tech sequence and non-college-prep courses, furthermore, it leaves out the population of IEP/504 students.

In a recent article, it was claimed that students have improved core academic skills as, "the study found that students who received the opportunity to attend a Career Academy earned 11 percent more than the control group" (Kemple & Willner, 2008). In the same article, it claimed another study concluded: "that attending a RVTS has no impact (positive or negative) on the standardized math and reading exams that all Massachusetts students take at the end of 10th grade"(Dougherty, 2018). The discrepancy in the studies shows that more studies need to be done on CTE education.

Lastly, a more recent article written by Jinghong Cai, “Compared with a decade ago, students with disabilities who participated in CTE programs made significant progress in academic proficiency in 2018. States may have changed standards for academic attainment in reading and math over the decade from 2008 to 2018. However, it should be noted that: 12 states experienced an increase in the percentage of IDEA students in CTE who met proficiency levels in reading, Eight states saw a percentage growth of IDEA students who enrolled in CTE and became proficient in math, In Massachusetts, almost three out of four IDEA students in CTE met the state reading proficiency level in 2018, In Florida, 45 percent of IDEA students in CTE met the state math proficiency level in 2018” (Cai, 2019). These results are encouraging enough to show that there is significant progress happening within Career Technical Education with students who have disabilities, which leads to the curiosity if that achievement is happening in Ohio. If so, then is that achievement more prevalent in a CTE School versus a Traditional School as it is plausible that Traditional schools are seeing similar growth currently as well. Previous literature shows that combining CTE and academics has positive results academically for students, I want to examine the next step that these previous studies are leading to which is how much do students who are on an IEP/504 grow academically compared to Traditional school. Which could give direction on how we should be handling students who are on an IEP/504 for the first ten years of their education instead of just their 11th and 12th-grade years.

The enrollment for Career Technical centers is increasing for multiple reasons such as alternative pathways to graduation, high-demand career fields, work placement, students just wanting a change in culture and learning environment, and lastly to gain

more College Credits during High School. The last one may be of some shock to you, but this is a new movement within Career Technical schools as the demands for Robotics, Engineers, Health Care, and Aviation are on the rise within in Greene County, Ohio and following quickly behind is the College Credit classes that support these fields. There was once a time that College Credits were offered at just the traditional schools, and you only went to a Vocational School to learn a trade job that a college degree wasn't needed. As the name from Vocational Schools shifted to Career Technical Schools so did the course and lab offerings. Actually dating back to the origination of vocational education where "federal support for vocational education in 1917, it was defined as preparation for occupations that do not require a bachelor's degree. Vocational courses and programs were therefore less academically rigorous" (Clark, Dayton, Stern, Tidyman, & Weisburg, 2007). This original perception has changed drastically as the need for Career Technical Schools and Community Colleges to work together to meet the demanding careers of today. There are a lot more careers nowadays that only require a certificate or an associate degree in which students can start earning a great paycheck and come out with little to no debt. One of the states that are seeing this rapid change is North Carolina. "In North Carolina, there is a community college within a 30-minute drive from more than 99% of residents within the state" (Deal, 2021). Since attending a community college is easily accessible the results for CCP classes at Career Technical Centers are drastically better in comparison to CCP classes that are offered at a traditional school. A recent study comparing the enrollment of each was done in 2021 and it showed the "effects of CCP on community college attainment are even larger for CTE students who are 5.6 percentage points more likely to earn their credential and earn about 8 more

credits than the overall CCP population” (Deal, 2021). The number of students who are attaining a community college credit is on the rise for students who attend a CTE School as the number of career fields offered by CTE Schools are requiring it. The shift is evident and according to the National Center for Educational Statistics “seventy-three percent of districts offered CTE courses for which students could earn both high school and postsecondary credit” (NCES, 2018). Locally at the Greene County Career Center, we are now offering ten college credit plus classes in the school year 2021-2022 and in the next two years, the Greene County Career Center will be offering four new college credit plus classes in just mathematics alone. There is a general consensus that the CCP classes are not only becoming more common in CTE Schools but students are achieving more college credits at a CTE School as they are required for a lot of the new and upcoming careers that if you wish to achieve those credits they are only offered at a CTE School versus a traditional school. The gap in this research is similar to the other studies and that is the success rate of students with disabilities attaining college credit at the High School level in traditional schools versus CTE Schools.

The gaps in research particularly with students with disabilities are lacking in college credit plus credits that are earned and CTE academic success for the older ages as well as the Magnet Schools academic success for the younger ages. As a country, we know that we are only graduating approximately two-thirds of the students with disabilities, and the research needed to improve the academic success of these students is needed to change that. “Experts estimate that up to 90 percent of students with disabilities are capable of graduating high school fully prepared to tackle college or a career if they receive proper support along the way” (Butrymowicz & Mader, 2020). The key is

receiving the proper support along the way. There should be more studies that decipher what that support is so that the education system stops failing these students from their legal right to an appropriate education. There have been some promising results that have been run on lottery-based studies on Magnet School with students with disabilities, but more needs done in focusing on just the population of students with disabilities in trying to measure academic performance based on being taught by a curriculum that is meaningful to them and pertains to their career interests at that point in time. Within Career Technical Education there needs to be more studies that measure the academic success of students with disabilities rather than just graduation rates which can be biased in terms of the alternative pathways to graduation. The population of students within Career Technical education is perfect to measure academic success as there is a large portion of students enrolled in Career Technical Schools and it also serves as a school of choice which will in return measure the engagement that a student has in their education. Also, within Career Technical School, we have a very rapid growth in college credit plus credits being attained by students who are clearly engaged in their education that they know is going to assist them in a career that interests them. With more college credits being earned and the population growth of students with disabilities in Career Technical Education, it will be assuring to see if the number of students who are attaining these college credits is students with disabilities. The forefront issue with education today is falling short in supporting students with disabilities and allowing them to not only graduate High School at similar rates as all American students but be college prepared as well. In a recent interview across thirty-four states, the responses “spoke of teachers inadequately trained to support special education students. Of districts lacking the

funding to provide needed supports. Expectations lowered to the point where they do students more harm than good. Of very capable students being pushed into “alternate” diploma programs, limiting their future options” (Butrymowicz & Mader, 2020). Results like this should not become the norm and tracking students to a Career Technical Center because they have alternative pathways to graduation and ignoring the education of the student is unacceptable. There must be more research on what helps the academic success of students with disabilities. If it is the community that is being present at a Career Technical Center that implores students to be more successful academically then that same type of community where students learn based on their interests should be presented at younger levels instead of waiting until their High School years.

Chapter 3 Methodology

Introduction

The objective of this study is to further solidify how we can improve the academic success of students with disabilities. To better understand how we can close the achievement gap of students with disabilities, we must not only take into account what educational approaches can be used to better serve students with disabilities, but also the type of environment we must provide for them to attain better academic success. As mentioned in the Literature review there is a lack of engagement that is happening in schools across America in which approximately two-thirds of students with disabilities don't graduate from High School. To address this problem, we need to monitor the success rates of students with disabilities in different school types to see if one school type is outperforming another school type.

The population of students with disabilities is increasing for Career Technical Centers because the High School graduation requirements have changed. This is a direct indicator that fewer students with disabilities are meeting the original graduation requirements of minimum scores needed to graduate High School on End of Course Exam assessments and/or college entrance exams such as the ACT/SAT tests. The mere fact that the State of Ohio is coming up with alternative pathways to graduation is more than a telling sign that the current education process is not working for students with disabilities. Even though no students are being left behind to satisfy the No Child Left Behind Act, it is a flawed system that is leaving our students with disabilities not being challenged nor supported to reach the initial required academic achievement set by the state.

In Chapter three there will be an overview of the problem and research questions. The best statistical approaches that will answer those questions. Further justification on the population chosen, data collection techniques, and data types chosen will best serve in modeling the academic success of students with disabilities in a CTE environment versus a traditional environment. All of this will be explained in the following outline: the study's settings, instrumentation, procedures, data processing, and analysis.

Setting and Participants

The following study takes place in Greene County, Ohio which is made up of seven school districts: Bellbrook, Beavercreek, Cedarville, Fairborn, Greenview, Xenia, and Yellow Springs. All seven of these school districts offer the opportunity to attend the Greene County Career Center starting their junior year. Currently, the number of students per graduating class per school is shown below:

Table #1

School	Number of students per graduating class
Bellbrook	207
Beavercreek	426
Cedarville	25
Fairborn	112
Greenview	31
Xenia	115
Yellow Springs	14

From these selected school's 271 students from these graduating class populations will come to the Greene County Career Center in their Junior year. The percentages of students with disabilities for each school district are defined below:

Table #2

School	% of students with disabilities	Number of students per graduating class with disabilities
Bellbrook	13.5%	28 students
Beavercreek	16.9%	72 students
Cedarville	16.2%	4 students
Fairborn	16.9%	19 students
Greenview	16.4%	5 students
Xenia	17.4%	20students
Yellow Springs	14.4%	2 students

The data for both tables one and two were compiled by the guidance office for each corresponding school district.

While these traditional schools are within 13.5% to 17.4% of their student population being labeled as students with disabilities the Greene County Career Center has 38.3% of their population being labeled as students with disabilities, which is 104 students per graduating class. The sampling is a reliable sample in testing students with disabilities as the percentage of students attending the Career Center is more than double any

traditional school in Greene County, Ohio. These numbers validate the necessity to test the academic success of these students so that it can be determined whether Career Centers are being used as a dumping ground to give out High School diplomas or do students with disabilities perform better academically and are selecting to go there themselves on their own accord and that transfers into them performing better academically. As the numbers have shown a good background for the need of this study, let's further examine the sample size of traditional schools in Greene County and the Greene County Career Center to see if it's large enough to answer the research questions.

Research question number one asks if gender, end-of-course exam scores, type of school, socioeconomic status, and support services type (504 or IEP) are predictive of ACT scores? A Priori Power Analysis was run using a linear multiple regression F-test with a standard medium effect size of 0.15 and alpha level of 0.05 to obtain a 95% confidence in the accuracy of our test revealed a minimum required sample size of 129. With the overall special education population totaling 254 students, the sample is a reliable sample.

Research question number two asks if there is a statistically significant difference in mean CCP credits earned by students with disabilities across school types? A Priori Power Analysis was also run in which the effect size was determined using a binary conversion for school type to be 0.537. The level of statistical power was set to 80% with type I error set to .05. The allocation ratio of traditional schools to career tech was $149/105=1.42$. The results concluded that there was a 95% chance of correctly rejecting the null hypothesis of no difference with a total of 116 students. So again, with a sample size of 254 students, the sample is a reliable sample.

Instrumentation

The data collected will be a mixture of quantitative data and qualitative data. The quantitative data will consist of sophomore end-of-course exam scores, senior act scores, and college credit plus credits earned. While the qualitative data will be socioeconomic status, gender, support service type, and school type. The data collected will be a convenience random sampling as the results are readily available upon the completion of the tests near the end of each school year. The data will also be provided as secondary data and prepared by each school's guidance office and cleansed of any student names before being sent in a Microsoft Excel file.

As there will be multiple data files coming in from multiple schools, the Director of Special Education at the Greene County Career Center will validate that no names will be given, and that data given is accurate and reliable according to their records before passing along the data for further analysis.

Having common assessments amongst school types is important in maintaining reliable conclusions. Both the Sophomore End of Course Exams Scores

Procedure

The ACT Tests will be given within the first two weeks of April throughout all of Greene County and each district will have their results by the end of April. Once the results are compiled within each district it will be asked of each guidance office to cleanse their data of student names and provide an excel spreadsheet of students' gender, socioeconomic status, support service type, school type, sophomore end of course exam scores, and act scores. Each guidance office will send their reports to the Greene County

Career Center's Guidance office in which they will validate that the correct data is given and cleansed of all student identifiers. Then the excel documents will then be passed on so that further analysis will be conducted to answer research question number one.

Once the school year is complete for Seniors towards the end of May for all school districts each guidance office will again then be asked to send an excel spreadsheet to the Greene County Career Center's Guidance office of students' support service type, school type, and college credits earned. In a similar fashion, the data will then be validated and cleansed of all student identifiers and the excel documents will then be passed on so that further analysis will be conducted to answer research question number two.

There are no concerns related to confidentiality. There is no interaction with participants and the data will be cleansed of identifying student information before it is analyzed, therefore complete confidentiality will be maintained. Since there will be no experimentation on the students, nor will there be any conclusions that involve any personal identifiers there is no need to get informed consent from the students. Before proceeding with this study there was a research proposal approved by Shawnee State IRB and the approval form can be found in the appendix.

In addition to confidentiality being maintained amongst the participants of the study, the common assessments of the ACT Test and End-Of-Course Exam testing are both reliable and valid tests that are created by a sub-party. The ACT test is created by the American College Test Inc and is a national test given across the United States to High School students who are looking to gain acceptance to a college or receive a scholarship to attend a college. The Ohio Department of Education creates the end-of-

course exams and is used to determine if a student is meeting Ohio State Standards set by the state and if a student earns enough points to receive their diploma. Both tests are recognized at the national and state level and provide not just a common assessment but a reliable and valid assessment that can be used for statistical analysis.

Subsection 4: Data Processing and Analysis (4 pages)

For both sets of data, a restructuring of school type will be set to traditional if the student attends Beaver creek, Bellbrook, Cedarville, Fairborn, Greenview, Xenia or Yellow Springs. While if a student attends the Career Technical Center the school type will remain Career Technical School. For support service type it will be set to yes if a student has an IEP or 504 and it will be set to no if a student does not have an IEP or 504.

The data set will have the results of students' scores on their sophomore end-of-course exams which are Language Arts I and II, Integrated Math I and II, American History, and American Government. While the ACT Score is a composite score of Math, English, Science, and Reading. The uncommon areas are history, government, and science. To have a more accurate comparison between exams the end-of-course exams scores of American History and American Government will be excluded from the data and each student will receive an average Sophomore End of Course Exam Score for their four exams taken in math and language arts. Language Arts I and Integrated Math I tests are taken during their freshmen year, while the Language Arts II and Integrated Math II tests are taken during their sophomore year. Students' ACT composite scores will be the average of their Math, English, Science, and Reading scores.

Aside from the non-common assessment areas between end-of-course exam scores and ACT, they both represent a common assessment that is taken amongst all

school types. The end-of-course exam score will be a common indicator of the student's current academic abilities in English and Mathematics by the student's sophomore year. Some students will choose to stay with their traditional school, and some will choose to attend the Career Center for the next two years. At the end of those two years, all students at each school type will be required to take another common ACT assessment their Senior year.

The data set will also have to be cleansed of any outliers of ACT test scores in which student's results consisted of no questions attempted as it is plausible that some students didn't attempt any questions as they already meet the graduation requirements by the alternative pathway and have no intention of attending college. Once the data is modified for each school type the data will be combined into one excel file and uploaded into R for further statistical analysis.

To answer the first research question, the independent variables of socioeconomic status, gender, support service type, school type, and sophomore end-of-course exam scores to find the best-predicted model of the dependent variable of ACT Scores. While the second research question, the independent variables of school type and support service type to test the dependent variable of mean college credit plus credits earned.

To find the best predictable model of ACT Scores multiple linear regression analyses will be run using backward elimination to identify which independent variable is a statistically significant predictor of ACT Scores. To achieve this, I will start off with verifying the assumptions necessary which are linearity, independence, equal variances, and normality. I will then produce a saturated model of all predictors and then precede by removing a predictor with the highest-order interaction until I find the best model that

predicts ACT Score. Once the best model is found a report of what predictors achieved the best model will be able to be determined and how statistically significant each predictor is to the model will also be able to be determined.

To see if there is a statistically significant difference in mean college credit plus credits earned using school type as my independent variable, an unpooled two-sample t-test will be required as there is one categorical variable with two groups, career and traditional schools, that are being used to predict one dependent quantitative variable. Before running a unpooled two-sample t-test, I will verify the assumptions necessary which are independence, equal variances, and normality. After running the test there will be an effect size calculation for just school type and the interaction of school type.

The descriptive statistics of the data is that the average percentage of students with disabilities that attends the Career Center is 38.3% while the average of all the traditional schools is 15.96% with each individual percentage or each traditional school is referenced in Table 2. These percentages are in relation to the school's overall population. If we focus on the sample population of just students with disabilities which totals 254 students 59% of them are coming from the 7 traditional schools, while 41% of the students will be coming from the Career Technical School.

Previous studies that have tried to predict ACT Scores from High School students have used Multiple Regression Techniques as well. I would like to reference a journal article written by Matt Townsley and Matt Varga who both are professors at the University of West Georgia. The set-up of their study was as follows: "Existing data were collected from two comparable high schools using different grading practices in a Midwestern state as determined by state department of education-provided

demographics: enrollment, socioeconomic status (as defined by percentage of students receiving free or reduced lunch), and ethnicity. Stepwise multiple linear regressions were used to determine if GPA and the method of high school grading practices, standards-based grading, or traditional grading, used predict ACT scores” (Townseley & Varga, 2018).

Another recent study performed by Ann Willott in 2017 conducted a two-sample t-test to examine college readiness by using the mean ACT composite scores of students who have completed a specific reading program compared to student’s who didn’t. This particular study was conducted as follows: “t tests were conducted to determine whether there is significant evidence that the mean ACT composite of the students who completed the Reading Recovery program is significantly different from the general population of students who took the ACT at both the state and district levels” (Willott,2017). Both recent studies bring affirmation that the techniques being chosen are appropriate for this study as well.

Summary

The objective of this study is to determine if academic success improves for students with disabilities that attend a Career Technical Center versus a traditional school as only two-thirds of students with disabilities are not graduating with a High School diploma in the United States. A lot of previous studies have tried to focus on different teaching techniques that should be used to help solve this issue amongst other studies you will find them talking about the fallouts of the IEP process. This study is to focus on the environment that needs to be offered to students with disabilities so that they can succeed. If a student with disabilities can be offered time in school to explore career

interests of their own, will that also translate to better academic scores even if the student-to-teacher ratio is not in the favor of the students with disabilities?

To measure if career interest education impacts academic success we must compare academic success rates of students in traditional schools versus career technical schools using common assessments that are taken in each school type. To measure academic success there will be two different research questions in which one focuses on ACT results and the other will be College Credit Plus credits earned. To best predict ACT results across gender, socioeconomic status, school type, support service type, and end-of-course exam scores will be a multiple regression analysis using backward elimination to find the best predictable model and being able to recognize each predictor as statistically significant or not. To measure academic success in terms of College Credit Plus credits earned over school type and support service type a two-sample t-test will need to be run as there is one categorical variable that is being used to predict a quantitative variable. The results of both studies will be indicative of how much school environments, in particular allowing students to explore career interests, will have on academic success for students with disabilities and if they are being better prepared for post-secondary education. The results may be indicative of a plausible solution for retaining interests and increasing the national graduation rate for students with disabilities in the United States.

Chapter Four

Results

In this chapter, the results of the data analysis will be presented by using the convenience sampling technique that was conducted to measure students with

disabilities' academic success in a traditional school versus a career technical school. To measure academic success, it was important to get to a baseline quantitative variable and a dependent quantitative variable to have a sense of measurement in the academic progress of students who remained in a traditional school or transferred to a Career Technical School during their junior year. The baseline quantitative data was the sophomore end-of-course exam scores which in the state of Ohio encompasses Language Arts I and II, Math I and II, Biology, US History, and Government. The dependent quantitative data was Senior's ACT Scores and the number of College Credit Plus credits that were earned by their Senior Year. In order to measure academic success, it was imperative to measure academic knowledge as well as academic preparation for college which is why there are two different dependent variables.

Data Cleaning

Data was collected from all the traditional High Schools in Greene County, Ohio which are the city schools of: Beavercreek, Bellbrook, Cedarville, Fairborn, Greenview, Xenia, and Yellow Springs in which each guidance department collected the quantitative data of students Senior ACT Scores, Sophomore End of Course Exam Scores, and the number of College Credit Plus credits that were earned from this year's graduating class of 2022. Each school's guidance office also collected the following demographics for each of the students: gender, socioeconomic status, and IEP/504. Once all the data was collected student names were deleted and transferred over to be reviewed and analyzed. In the same regard the guidance office of the Greene County Career Center collected the same quantitative data and demographics for their students and transferred over to be reviewed and analyzed.

All data was cleansed of student names and is why the IRB approved the study to be under exempt status, but the data had to be cleansed so that it was consistent across each school district. The first set of data that was cleansed was to limit the data down to the population that the study is focusing on which is students with disabilities. So, students that were not on an IEP or 504 were excluded from the data. Furthermore, since the independent variable is the end-of-course scores, and the dependent variable is the ACT scores it was best to eliminate any subject area that was not common between each assessment type. The ACT composite score had to be calculated for each district as the initial data was presented by what each student scored in each part of the ACT Test which was Math, Reading, Writing, and Science. The average of all subparts of the ACT rounded to the nearest whole number made up each student's ACT composite score. In a similar fashion the end-of-course exam scores were Language Arts I and II, Math I and II, Biology, US History, and Government in which not all students had taken all of the tests as students may take them in different years due to their personal academic track. So to be consistent across school district Biology, US History, and Government were excluded for multiple reasons. First reason is that they are non-parallel content areas with the ACT and the second reason is that not all students had taken those tests. The majority of the students had taken at least both Language Arts portions and both Math portions, so the average of those four scores made up the student's overall end-of-course exam score. The few that didn't have all four parts were excluded from the overall data. Once this was completed for each school type it was compiled into one excel file with the following column headings: School Type, Gender, Socioeconomic Status, ACT, EOC, and CCP.

Descriptive

The demographic data for the traditional schools of a sample size of 150 had 70 Females (46.67%) and 80 males (53.33%) who were on an IEP or 504. There are 11 students who are on free-reduced lunch (7.3%) and 139 students who were not (92.67%). The breakdown of students by traditional school district was Bellbrook (n=28), Beavercreek (n=72), Cedarville (n=4), Fairborn (n=19), Greenview (n=5), Xenia (n=20), and Yellow Springs (n=2).

The career technical school has 41 females and 63 males who were on an IEP or 504. There are 23 students who are on free-reduced lunch (22.1%) and 81 who are not (77.9%). So collectively there is a total of 254 students with 111 females (43.7%) and 143 males (56.2%). The first table represents the mean and standard deviation of scores of ACT, End-of-Course, and CCP credits earned by career technical schools.

Table #3

Assessment Type	Mean	Standard Deviation
ACT Composite Score	19.5	3.5
End-of-Course Average (Language Arts I and I, Math I and II)	3	0.73
CCP credits earned before graduation	1.38	3.17

The second table represents the mean and standard deviation scores of ACT, End-of-Course, and CCP credits earned by traditional schools.

Table #4

Assessment Type	Mean	Standard Deviation
ACT Composite Score	19.2	4
End-of-Course Average (Language Arts I and I, Math I and II)	3.4	0.75
CCP credits earned before graduation	0.22	0.86

Some noticeable trends here are that the average ACT score was higher for Career Technical Schools, while the students who were selected to attend the Greene County Career Center their sophomore year had a lower End-of-Course Exam average between Language Arts I and II and Math I and II. So initially it seems that the students at Career Technical Schools made more progress in academic knowledge. In the same regard, the average college credits earned were higher for Career Technical schools than the traditional schools for students with disabilities.

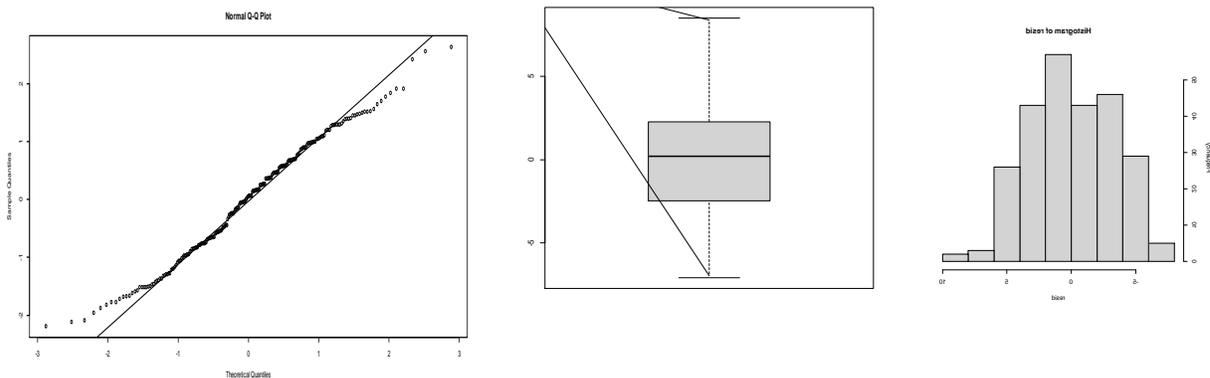
Hypothesis and Descriptive Analysis

A multiple linear regression analysis using backward elimination was run to identify the best predictors of ACT Score from the independent variables of support service type (IEP/504), gender, school type (traditional/career), socioeconomic status (Free-Reduced Lunch or not), and sophomore end-of-course exam score (average of Language Arts I and II, Math I and II). There were twenty-five cases that had missing

ACT data or end-of-course data, so they were deleted from the sample, giving a final sample size of $n=254$. Since the number of cases per predictor easily exceeds 15, there was no concern with an adequate sample size. Analysis was performed using R 4.1.0.

The Shapiro's test for normality revealed concerns; $W= 0.987$, $p=0.02$. This causes little concern with normality as the p -value < 0.05 , but all the standard residuals are less than ± 3 showing consistency within the model. Looking at the q-q plot there is some deviation on both the upper and lower ends which shows that the data has thinner tails than a perfect normal distribution and there are not very many outliers in the data. When looking at the boxplot and histogram of the residuals there are no outliers and symmetry is shown so this confirms that the data has thinner tails on the end with no outliers so even though the normal assumption is violated by the Shapiro's Test, the charts below show that there weren't as many ACT Scores impacted on the low or high end for students with disabilities. So, most of the students with disabilities didn't score too low or too high on the ACT test.

Chart 1



The evaluation of the assumptions of independence, homogeneity of variances, and linearity had no concerns. Independence was tested with the Durbin-Watson Test, which revealed a D-W statistic = 1.8, $p=.06$. There was also no pattern found when plotting the fitted over the residuals to check for equal variances and linearity assumptions, displayed in Chart 2. To confirm homogeneity of variance a Levene's Test was run over the interaction of all the independent variables, and it revealed an F-Statistic = 1.04, and a $p\text{-value}=.4154$ which isn't statistically significant and failing to reject the null hypothesis that the data has homogeneity of variances. Multicollinearity was also examined using the Variance Inflation Factors, which ranged from 1.01(Gender) to 1.14(School)

Chart 2: Plot Fitted Over Residuals

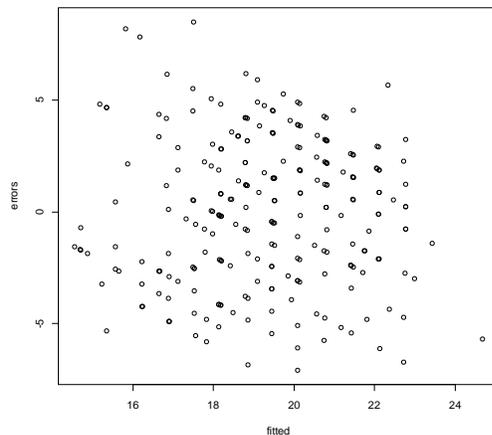


Table 3 displays the correlation between ACT and End-of-Course which are the only two quantitative variables. The mean ACT is 19.3 and the standard deviation of ACT is 3.8, while the mean and standard deviation for End-of-Course is displayed below. The

categorical variables had the following baseline values: Schools-Traditional, Free-Reduced Lunch-No, Gender-M, Special Education-IEP. The beta values and standard errors for both categorical and quantitative variables are also given in Table 1.

A test of the full model against the intercept model was significant; $F(5,248)=19.3$, $p\text{-value}<0.001$. The set of predictors in combination contributed to approximately 27% of the variance in ACT score. The EOC,SCH, and Special predictors returned as significant and the test-statistic and confidence intervals are presented for each: EOC ($t=9.36,(2.06-3.16)$), SCH($t=2.82,(0.38-2.13)$), Special($t=-2.68,(-2.67—0.41)$). Examination of outlier cases, high standardized residuals, and influential cases led to the deletion of no cases.

Table 5

Variab les	EO C	SCH	FRL	Gender	Special	B	SE
ACT	0.4 7						
EOC						2.61** *	0.2 8
SCH-C						1.26**	0.4 5
FRL-Y						-0.36	0.6 2
Gender -F						0.67	0.4 2

Special -504						-1.54**	0.5 7
Intercept						10.35* **	1
Means	3.2 4						
St.Dev	0.7 8						
Freq/%		150 traditional(59 %) 104 career(41%)	220 No(86.6 %) 34 Yes(13.4 %)	111 females(43.7 %) 143 males (56.3%)	213 IEP(83.9 %) 41 504(16.1 %)		
Adjusted R ² =0.27							
F(5,248)=19.3, p-value < 0.001							

Note:*,significant at the .05 level, **, significant at the .01 level; ***, significant at the .001 level

Interpreting the results of the statistically significant categorical predictors with baseline data showed that when a student switched from a traditional school to a career technical school their ACT score increased by 1.26 points. Similarly, for every student who was on a 504 compared to an IEP, their ACT score decreased by 1.54 points. This can be a telling sign that students who received individualized instruction tailored to their

levels performed better than the 504 students who were mainstreamed with the general education courses. Lastly, the best predictor of ACT Score was a student's Sophomore End-of-Course Exam score as for every unit increase in End-of-Course there was an increase of 2.61 points on their ACT. The results are influential and provide affirmation that students with disabilities perform better academically in a Career Technical School versus a Traditional School if Sophomore End-of-Course Exam scores average of Language Arts I and II, Math I and II are used as a baseline score and ACT Score is used as a dependent variable to measure academic success.

The previous results are great in measuring the academic performance of students with disabilities, but academic performance can also be measured by how many college credits are earned in High School. Clearly, if a student is earning College Credits in High School, they are intrinsically motivated and have a focus on what they want to do post-High School in any occupation that requires a degree. College Credit plus classes in High School are not mandatory and a student showing the willingness to take a college credit plus course shows their intrinsic motivation to be academically successful. To measure this intrinsic motivation of students an unpooled two-sample t-test will be run to examine the difference in the mean CCP credits earned across school type using the population of students who are on an IEP/504 plan.

Chart 3 is a box plot of college credit plus credits earned over school-type career(1) and traditional(2) and there was a considerable difference in outliers, while the medians were the same as the majority of the students didn't earn college credit plus credits for both school types. To get a better breakdown of individual student progress in

both school types Table 6 was created to show the number of students who earned a certain amount of college credit plus credits per school type.

Chart 3

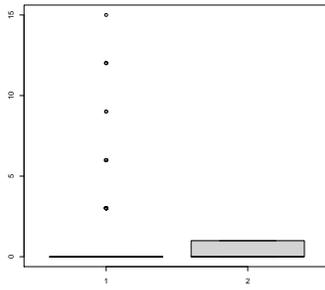


Table 6 (Number of Students that earned CCP Credits

CCP Credits Earned	Career Tech School	Traditional School
0	82	139
3	11	9
6	5	1
9	2	0
12	4	0
15	1	0

Since the samples were collected randomly from each population of school type, independence may be assumed. However, the results of the Shapiro-Welks test indicated possible threat to the normality assumption not being met (Not accepted: $W=0.27$, $p\text{-value}<.001$, Not accepted: $W=0.5$, $p\text{-value} < 0.001$). There is also a threat to the homogeneity of variances assumption not being met as the results of the Levene's Test revealed a test statistic $=71.7$, $p\text{-value}<0.001$. The normality assumption not being met shows that the data doesn't follow a symmetrical bell curve and the data is not dispersed proportionally. While the homogeneity of variances of both samples reveals that the

deviation from both sample means is not equal. This is confirmed by comparing averages and standard deviations of population sizes in relation to college credit credits earned as the students in career technical schools ($M=1.37$, $SD=3.17$) is significantly higher than students in traditional schools ($M=0.22$, $SD=0.86$).

A Welch two sample t-test was run, $t(113.45)=3.64$, $p\text{-value}<0.001$, with a 95% confidence interval (0.53,1.8). The effect size, 0.537 is moderate showing that there is practical significance in the t-test. Though the violations of normality and homogeneity of variances are violated due to the majority of students with disabilities not receiving college credit (78%-Career Tech, 93.3%-Traditional) it goes to show that both school types show a distribution heavily skewed right and there is a need to engage and support students with disabilities in order to attain college credit in High School. It also goes to show that students with disabilities are more likely to attain college credit at a Career Technical school as the resulting t-test rejects the null hypothesis leading to the fact that the means between the two samples are not equal at the 0.001 significance level. The results confirm what previous research has stated and verified in the literature review. Which is that Career Technical schools are being pushed to meet the demanding jobs of today such as: health science, information technology, digital media, aviation, engineering, and robotics. These career fields are requiring students to earn a degree or certificate. In collaboration with these career fields and the large population of students with disabilities attending a career tech school shows that more students with disabilities are taking college credit plus classes.

The research shows that the trend for students with disabilities are performing better academically and are achieving more college credits in career technical schools than

in traditional schools. Though there is plenty of room for growth for students with disabilities in both school types, it is evident that career technical schools in Greene County, Ohio are increasing student's academic content knowledge in relation to the ACT and motivation in taking/earning college credit plus classes in a very short time frame of two years. The skewness in both schools in relation to college credit earned shows that there is a lot that can be improved in the IEP/504 process within all school types, but it is clear from this study that allowing a student identified with a disability to attend a career center increases their engagement as they are forced to choose a career path, which in return increases their preparation for college in terms of ACT scores and college credits earned.

Chapter 5 Summary

Research Motivation

There are only two-thirds of students with disabilities that currently graduate High School due to the lack of support and interest in content areas. Supporting students who are on an IEP is an ongoing process that needs constant re-evaluation and should change as a student grows in their educational abilities. As shown in previous research this isn't always done and unfortunately, students don't receive the support that they need to be successful. Though the inefficiency of the IEP process is certainly a culprit in low graduation rates, the motivation of this study is to investigate the lack of engagement that students with disabilities feel. Capturing the interest of the student is the most important factor in education, in simple terms, there are not enough avenues for students to receive an education in a traditional school and students lose interest and drop out before even the ninth grade. The main motivation behind this study is to discover how much can

career interest environment impact academic achievement with students with disabilities as that is the population of students that are not finishing High School.

As mentioned in the literature review there is a lot of research that shows students' self-efficacy in their academic abilities is directly related to their career interests. If a student has a goal of a career, then they will rise to the benchmarks necessary to be able to attain that career. So instead of telling students, that they must meet these specific High School standards to graduate High School, it is rephrased as you need to meet these benchmarks with a certain GPA to attain this career choice. This mindset can be found in career technical centers across the country and the need in measuring the academic success of these career technical centers compared to traditional schools must be analyzed not just because of the obvious change in the mindset of the students that attend. But also because of the large population of students with disabilities that attend career technical schools.

The forever-changing High School graduation requirements show that the bar can be moved so that more students can obtain a High School diploma. If a student doesn't reach the required benchmark on their end-of-course assessments then they may still earn a High School Diploma by earning points on WebExams, Job Readiness Seals, and enlisting in the military which career technical schools focus heavily on. The result is a funneling effect of students wanting and needing to attend a career technical school to graduate. Though it may make the percentages look better as far as graduating percentages the fact that students are performing at a higher academic level is still in question. So, in addition to the motivation of exploring the impact of a career-interest curriculum on academic achievement, this study also will confirm if students with

disabilities are achieving better academically at a career technical school versus a traditional school. They are being forced to move into career-technical education for graduation requirements but whether that is the best move for them in terms of improving academic abilities was still undecided. This study focuses on the students who are on an IEP/504 only and how they perform academically in each setting of career-technical school versus traditional school is enlightenment on career-interest education and its impact on students with disabilities on an academic level. Within this sample of students, it was shown that career tech students performed better on the ACT than traditional students which is a reassurance that career technical education is not just a funneling ground to meet graduation requirements, but students are growing more academically.

Research within Theoretical Framework

A career-technical school allows students to pick a career interest and study/practice the skills necessary to be good in that career choice. It also allows an opportunity for students who similar career interests to be together for half a school day. This is the central focus of this study as this allows students' social-emotional needs to be met. Giving students ample amount of time to interact with other students that have similar goals provides the intrinsic motivation needed to be academically successful. They all have a common purpose and mission to be successful in that career choice. In order for a student to be successful in their lab, they also have to be successful in their academics. The two areas are connected, and the career technical schools provide the

social environment that tests the theoretical framework that student academic performance increases if their social-emotional needs are being met.

It was shown in the results that students with disabilities who attended career-technical schools not only scored higher on their ACT Scores but also earned more college credit. Students with disabilities were more likely to take these courses as well compared to traditional schools. Though most students with disabilities didn't earn college credit in both school types, students were more than three times more likely to earn college credit at a career technical school than at a traditional school. The results showed that the intrinsic motivation was higher in a career technical school to take more advanced classes as they are required to meet the requirements of the career that they are interested in. It shows that if students are intrinsically motivated, they are willing to stretch their academic performance to meet the requirement needs of a profession and to reach the same levels as their peers that have similar career interests.

It is reassuring to see positive academic results from students with disabilities in which the only difference is the environment that they are in. The teaching tactics of the core academic areas remain the same between the two school types, but the environment is different in which students are competing against their peers that have similar career interests. They also have accountability in achieving similar goals as the intrinsic motivation seed is planted to a student that says they need to perform academically to be accepted into a career versus telling them they need to perform academically to achieve a High School Diploma. That is the centralized difference in the message that is being given to the school types and students are responding better academically with career-interest education as an environment is being created in which the student's social-

emotional needs are being met every day by their own peers. Whereas in a traditional school, students with disabilities needs are re-evaluated whenever a reevaluation meeting is set up for each student per IEP/504 requirements.

If a student is intrinsically motivated to do better academically their support system is themselves in addition to their educators and peers. Educators and peers are inconsistent compared to the student themselves. If a child is motivated in attaining a career and is given a list of benchmarks necessary to achieve that then they are able to self-evaluate their progress and more importantly willing to do it. Whereas in a traditional school a student's motivation is to graduate High School and need more support in achieving that goal as they are not as motivated and engaged as they are in mixed classes with students with different goals. Sure, students will have similar interests, and friendships are formed. But if a classroom environment is created where students' interest is career-driven then their academic performance is tied to that and the result is an environment that allows students to hold themselves accountable and allow the student to advocate for themselves on certain needs instead of waiting on an IEP/504 meeting. In past studies, it is widely known of the struggle of the IEP process has its flaws in meeting the educational needs of students with disabilities, and in large part, it is due to the inconsistency of re-evaluating the needs and setting new goals for too many students. The learning needs of a child are forever changing, and an environment needs to be created in which they have a revolving support system that is forever reaching the needs of a child to reach a common goal. If you have multiple students reaching the same goal instead of just one individual child trying to reach his/her specific goal brings in accountability. Having a student's social-emotional needs met creates an environment of common goals,

accountability, and a support system that allows the needs of a student with disabilities to be constantly met. The results of high ACT scores and more college credits earned at career technical schools for students with disabilities show that an environment that is career-based provides a better support system than what can be provided in a traditional school.

Compared Results with Literature Review

The results of this study clearly show that within two years students with disabilities are performing better academically in a career technical school versus a traditional school aside from the overlying fact that graduation rates are better as well due to the changes in graduation requirements. The alternative pathways to graduation allow career centers to help alleviate the fact that nationwide only two-thirds of students graduate from high school. If other states are taking similar approaches as they are in the state of Ohio, then I would see this percentage of graduates improve as the bar has been moved. But the most reassuring fact from this study is that students with disabilities are performing better academically when given a career-based atmosphere.

Within the literature review, there has been some positive academic success with Magnet Schools which are schools that are driven by a career track curriculum. It is also offered to younger ages other than just Juniors and Seniors like a career technical school in Greene County, Ohio. At this point in time the Greene County Career Center doesn't offer a career track curriculum for their academics, but a career-based environment only. So, seeing academic progress still shows that the students are intrinsically motivated to improve themselves academically as the goal for them is to obtain an education that will support their career choice versus just graduating high school.

The shift and focus of Career Centers are changing as more and more students at Career Centers are being pushed to earn college credit than ever before. The perception in the past of career tech is that students go there to learn a trade that doesn't require a college degree, whereas now there are more careers that require a college degree and students can start learning the skills for that trade and earn credits towards their degree in High School. This study shows that even though most students with disabilities in both school types don't earn college credit while in high school. Students are more likely to earn college credit at a career technical school than at a traditional school.

This study supports previous findings that a career-based curriculum and atmosphere improve academic success with students and that there is more validity standing behind Magnet Schools studies in that these school types need to be offered throughout the nation and not just in selected cities. Students with disabilities are in constant need of support and the support that is needed is forever changing. So, to think an education system that revolves around annual IEP meetings will be successful for students is a great start but lacks the consistency and the ability to match the forever-changing needs of a student with disabilities. The atmosphere delivers better results than the IEP/504 annual meeting process that takes place in traditional schools across the country. You can have the IEP/504 recommendations for a student to be successful but without the implementation of those recommendations in a school atmosphere that allows students to hold themselves accountable by allowing students' social-emotional needs to be met the process will fall short. The power of a student-to-student ratio is much more powerful than the teacher-to-student ratio. The educational system needs to be designed in such a way that provides the intrinsic motivation for a student to attend, then the

district employees are there to guide the students to be able to reach their goals of not just graduating but obtaining a career. Preparing students after High School should be the sole purpose of education nationwide rather than just meeting benchmarks of academic abilities. As shown in this study if an atmosphere is created with the purpose of preparing a student to be successful in some career post-high school, then academic performances will follow with it. Telling students that they must meet certain benchmarks or standards to graduate may motivate most as they already have a support system that allows them to be successful, but the current one-third of students with disabilities don't have that support system to be successful in graduating from high school. They need to be supported to be successful instead of just moving the bar for graduation requirements so that they can graduate.

Limitations & Improvements of Study

One limitation of this study is that the sample was taken from Greene County, Ohio. In order to make more accurate predictions about the country, a stratified sampling technique would be better than the convenience sampling technique taken in this study. It would also be necessary to conduct two sets of stratified sampling studies as one should select a proportional amount of students in selected counties throughout the country within large cities, while the other should select a proportional amount of students in selected counties throughout the country that is not within large cities. The larger cities are making up the majority of the student populations as the school districts are much larger and the school atmosphere has to be questioned. School environments are the central focus of this study and how that affects students with disabilities' academic success, so it would be necessary to separate the sampling in the same manner.

Another limitation of this study is the number of college credits earned by students with disabilities can be misinterpreted within a couple of years. The culture shift of students attending career technical schools to achieve college credit is a new shift as the job demand in this country is shifting to require this. In addition to better sampling techniques like stratified sampling, it would also be insightful to see the progression of these findings over the course of several years especially when it comes to making claims about college credits earned by students with disabilities.

With the ability to get a broader understanding of across the country, larger populations versus smaller populations, and results over the course of several years there would be more solidified predictions of career-based environments making positive academic impacts on students in High School. One challenge that will be presented in some career technical schools is not accepting students until their Junior year of High School. Whereas in other areas it can be much sooner which is very comparable to Magnet Schools in which students participate in a career-based curriculum at younger ages decided by the district. So, it would be important to find school types with similar time frames in which students attend the career technical school and leave their traditional schools across the country. It would be extremely beneficial to really focus on counties with large populations where the potential of non-supportive environments for students with disabilities is more likely and to measure the academic progression solely within those environments.

Further investigation into Magnet Schools also needs to be explored as they are extremely popular in larger cities. “According to the U.S. Department of Education, more than half of large urban school districts have magnet school programs as compared to

only 10% of suburban districts” (Chen, 2022). A reasonable hypothesis is that larger districts are struggling with school environments and are resorting to career-based curricula already to increase academic success, so it would also be reasonable that with a further investigation that educational reform is needed across all districts if positive results are being shown across the country in career technical schools and magnet schools that are career focused.

This study provides great insight into some plausible educational reform that is needed to improve the academic success of students with disabilities. It also adds affirmation to previous studies that found academic success within these school types. If the recommendations for improving this study across different populations and locations can be attained, it would provide enough backbone to start educational reform that could help reach students with disabilities.

REFERENCES

- Anthony, J. (2021, March 26). *There are many factors that can influence a student's decision whether to pursue a vocational degree at*. Financesonline.Com.
<https://financesonline.com/trade-school-college-statistics/>
- Bottoms, G., Han, L., and Presson, A. (2007). *Comprehensive School Reform: Making a Difference in Improving High Schools*. Atlanta: Southern Regional Education Board.
- Butrymowicz, S., & Mader, J. (2020, March 30). *Almost all students with disabilities are capable of graduating on time. Here's why they're not*. The Hechinger Report. Retrieved March 26, 2022, from <https://hechingerreport.org/high-schools-fail-provide-legally-required-education-students-disabilities/>
- Cai, J. (2019). *CTE and Special Education*. Jinghong Cai.
<https://www.nsba.org/ASBJ/2019/October/CTE-Special-Education>
- Candisky, C. T. C. D. (2020, October 15). *Students at Ohio charter schools show greater academic gains, report finds*. The Columbus Dispatch. Retrieved March 25, 2022, from <https://eu.dispatch.com/story/news/education/2020/10/15/ohio-charter-schools-higher-black-students-test-scores-critics-say-data-skewed/5969117002/>
- Center for Public Education. (2019, December 2). *IDEA FACTSHEET: #2 STUDENTS WITH DISABILITIES IN CAREER AND TECHNICAL EDUCATION (CTE)*.
Https://Files.Eric.Ed.Gov/. Retrieved March 26, 2022, from <https://files.eric.ed.gov/fulltext/ED608895.pdf>

- Chen, G. (2022, June 8). *What Is A Magnet School?* | *PublicSchoolReview.com*. Public School Review. Retrieved July 15, 2022, from <https://www.publicschoolreview.com/blog/what-is-a-magnet-school>
- Clark, Dayton, Stern, Tidyman, & Weisberg. (2007, October). *Can Combining Academic and Career-Technical Education Improve High School Outcomes in California?* <https://casn.berkeley.edu/>. Retrieved March 23, 2022, from https://casn.berkeley.edu/wp-content/uploads/resource_files/ca-dropout-project410-06-03-12-54-51.pdf
- Closing the Achievement Gap . Charter School FAQ* | PBS. (2004, May 3). Pbs.Org. Retrieved March 25, 2022, from <https://www.pbs.org/closingtheachievementgap/faq.html>
- CPS Testing & Assessment - High School End-of-Course Exams*. (2021). CPS Testing and Assessment. <https://sites.google.com/cpsboe.k12.oh.us/cpstesting/ohio-state-testing/high-school-end-of-course-exams>
- CTE data story: insights into how CTE can improve students' income after they graduate*. (2019). U.S. Department of Education. [https://www2.ed.gov/datastory/cte/index.html#:~:text=Career%20and%20technical%20education%20\(CTE\)%20provides%20an%20important%20pathway%20to,interests%20and%20unique%20learning%20needs](https://www2.ed.gov/datastory/cte/index.html#:~:text=Career%20and%20technical%20education%20(CTE)%20provides%20an%20important%20pathway%20to,interests%20and%20unique%20learning%20needs).
- Deal. (2021, May). *The Effect of the Career and Technical Education Pathway on Community College Attainment: An Instrumental Variables Approach*. Belk Center for Community College Leadership and Research. https://belk-center.ced.ncsu.edu/wp-content/uploads/2021/05/Deal_Research-Brief_CTE.pdf

- Dougherty, S.M. (2018). “The Effect of Career and Technical Education on Human Capital Accumulation: Causal Evidence from Massachusetts.” *Education Finance & Policy*.
- (2022, February 11). *37 High School Statistics 2022 - Graduate and Drop Out Rate*. ThinkImpact.Com. <https://www.thinkimpact.com/high-school-statistics/#:~:text=It%20is%20estimated%20that%203%2C650%2C000,%2C%20an%20all%2Dtime%20high>.
- Fan, W. and Wolters, C.A. (2014), School motivation and high school dropout: The mediating role of educational expectation. *Br J Educ Psychol*, 84: 22-39. <https://doi.org/10.1111/bjep.12002>
- Flavin, B. (2016, July 4). *The Ultimate Guide to 13 Different Types of Schools Across America* | Rasmussen University. Rasmussen.Edu. Retrieved March 25, 2022, from <https://www.rasmussen.edu/degrees/education/blog/types-of-schools/>
- Fox, & Buchanan. (2017, March 13). *The Wiley Handbook of School Choice*. Google Books. Retrieved March 25, 2022, from https://books.google.nl/books?hl=en&lr=&id=0ygnDwAAQBAJ&oi=fnd&pg=PT260&dq=academic+success+of+magnet+schools&ots=rduHb7jYlb&sig=60O8RPAdj_B6lVdl3TCsg5pCxHE&redir_esc=y#v=onepage&q&f=false
- Jacob, B. A. (2017, October 4). What we know about career and technical education in high school. Brookings. Retrieved October 23, 2021, from <https://www.brookings.edu/research/what-we-know-about-career-and-technical-education-in-high-school/>.
- Kelly, S. & Price, H. (2009). Vocational education: A clear slate for disengaged students? *Social Science Research*, 38(4), 810–825.

- Kemple, J & Willner, C.J. (2008). Career academies: Long-term impacts on labor market outcomes, educational attainment, and transitions to adulthood. MDRC.
- Levenson, N. (2020, December 8). *Special Education Reform Is Entering a New Era (Opinion)*. Education Week. <https://www.edweek.org/education/opinion-special-education-reform-is-entering-a-new-era/2019/02>
- Maciag, M. (2021, June 14). *High School Graduation Rates by State*. Governing. <https://www.governing.com/archive/high-school-graduation-rates-by-state.html>
- Malkus. (2019, August 28). *The evolution of career and technical education: 1982–2013*. American Enterprise Institute - AEI. <https://www.aei.org/research-products/report/the-evolution-of-career-and-technical-education-1982-2013/>
- National School Choice Week Team. (2022, February 17). *Ohio School Choice Roadmap*. National School Choice Week. <https://schoolchoiceweek.com/guide-school-choice-ohio/#:~:text=Ohio%20families%20can%20choose%20from,%2C%20homeschooling%2C%20and%20learning%20pods.>
- Ohio Department of Education. (2019, August). *Ohio High School Graduation Requirements*. Education.Ohio.Gov. Retrieved March 9, 2022, from <https://education.ohio.gov/getattachment/Topics/Ohio-s-Graduation-Requirements/Earning-an-Ohio-High-School-Diploma-for-the-Cl-2/GradReq2021.pdf.aspx?lang=en-US>
- Schmalzried. (2010, December). *Special Education and Career and Technical Education Collaboration and Communication: Process, Practice, and Perception*. https://cardinalscholar.bsu.edu/bitstream/handle/123456789/194626/SchmalzriedJ_2010-1_BODY.pdf?sequence=1&isAllowed=y

- Stearns, E., & Glennie, E. J. (2006). When and Why Dropouts Leave High School. *Youth & Society*, 38(1), 29–57. <https://doi.org/10.1177/0044118X05282764>
- Stern, D. and Stearns, R., 2007. Combining academic and career-technical courses to make college an option for more students: Evidence and challenges.” In Oakes, J. and Saunders, M. (eds.): *Multiple Perspectives on 89 Multiple Pathways*. Los Angeles, CA: Institute for Democracy, Education, and Access, UCLA.
- Stone, J. R., III, Alfeld, C., Pearson, D., Lewis, M. V., and Jensen, S., 2005. *Building Academic Skills in Context: Testing the Value of Enhanced Math Learning in CTE (Final study)*. St. Paul, MN: National Research Center for Career and Technical Education. (Available from National Dissemination Center for Career and Technical Education, The Ohio State University, 1900 Kenny Road, Columbus, OH 43210-1016; <http://www.nccte.org>)
- Townsley, & Varga. (2018). Getting High School Students Ready for College: A Quantitative Study of StandardsBased Grading Practices. *Journal of Research in Education*, 28, 92–112. <https://files.eric.ed.gov/fulltext/EJ1168171.pdf>
- University of California, Berkley. (2007, October). *Can Combining Academic and Career-Technical Education Improve High School Outcomes in California?*
- Patricia Clark, Charles Dayton, David Stern, Susan Tidyman and Alan Weisberg.
- U.S. Department of Education, National Center for Education Statistics (2018). *Career and Technical Education Programs in Public School Districts: 2016–17* (NCES 2018-028).
- Walden University. (2021, March 25). *What Is a Magnet School, and Does it Offer a Better Education?* Retrieved March 25, 2022, from

<https://www.waldenu.edu/programs/education/resource/what-is-a-magnet-school-and-does-it-offer-a-better-education>

Wikipedia contributors. (2021, November 28). *ACT (test)*. Wikipedia.

[https://en.wikipedia.org/wiki/ACT_\(test\)](https://en.wikipedia.org/wiki/ACT_(test))

Willott, A. M. W. (2017, January 11). *A Study of Early Literacy Interventions on the College and Career Readiness of High School Students Identified as Struggling Readers in First Grade*. University of Missouri, St. Louis. Retrieved June 30, 2022, from

<https://irl.umsl.edu/cgi/viewcontent.cgi?article=1027&context=dissertation>

Zogby, M. (2020, March 24). *Did You Know? Trade Schools Showing Strong Enrollment Growth*. The James G. Martin Center for Academic Renewal.

<https://www.jamesgmartin.center/2020/02/did-you-know-trade-schools-showing-strong-enrollment-growth/>

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