



# Buffalo Public Schools

*Putting children and families first to ensure high academic achievement for all*

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## **RESEARCH CAPSULE**

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### **Focus on CTE Programs**

#### **AT A GLANCE**

In the 21<sup>st</sup> century, a strong concern was expressed about providing education for all students and making high school students ready for the workforce. The first concern was expressed in 2001 No Child Left Behind (NCLB) Act which emphasized that the national educational system is responsible for all students' education. And the second concern originated was to offer Career and Technical Education (CTE) programs designed with the purpose to offer technology-driven curricula and to promote higher order thinking in students so that they can compete in global economy. Overall, the purpose of CTE programs was to align post-secondary education with workforce readiness skills. While there are confounding arguments about the value of CTE programs research also suggested that CTE program graduates comprise 70% of those hired full-time in the field of Medical/Health/Social Services. This creates the rationale for looking at research conducted on CTE programs to learn about research findings that can contribute to making CTE programs even more effective.

#### **Introduction**

Career and Technical Education (CTE) programs originated to assist high school students in developing skills that could help them secure both post-secondary education and employment after school graduation. To ensure that CTE program students have equal opportunity to be taught the same rigorous content aligned with challenging academic standards as other students, educators suggested that academic programs integrated with CTE programs. Throughout years, different lines of research emerged. Attempts were made to explore the following: (i) impact of CTE programs on on-time high school graduation and career goals (ii) alignment of CTE and career objectives, (iii) impact of CTE program on student subgroups (e.g. gender, ethnicity, disabilities). Sample studies are presented below.

## Empirical Research on CTE

### *CTE Impact on On-Time Graduation, Career Goals and Placement*

A number of studies attempted to compare CTE and non-CTE programs. Dougherty (2016) conducted a study to explore if Career and Technical Education in high school improves student outcomes. The findings of the study suggested that in general, taking just one additional CTE course above the average increases a student's probability of graduating from high school by 3.2 percentage points and of enrolling in a two-year college the following year by 0.6 percentage points. It also increases a student's probability of being employed the year after graduation by 1.5 percentage points and boosts his or her expected quarterly wage that year by \$28 (or roughly 3 percent). Dual enrollment—earning college credit while still in high school—magnifies the impact of an additional CTE course by doubling the probability that a student would enroll in a two-year college the year after graduation. All of these differences were statistically significant.

Jaime (2017) conducted a quantitative causal-comparative study to examine the effect of CTE concentration, non-CTE concentration and academic concentration on the on-time high school graduation. The results of the study suggested that students in CTE concentration were 4.088 times more likely to have higher on-time graduation over students in academic concentration.

Mobley, Sharp, Hammond, Withington and Stipanovic (2017) conducted a study to compare CTE and non-CTE students on their interactions with guidance counselors, level of participation in career planning and development, and beliefs about the relevance of the career major to their educational and career goals during early stages of policy implementation. CTE students reported higher levels of involvement in career planning and career related activities than non-CTE students and the differences were statistically significant. Researchers concluded that the results show program participation may lead to positive changes in the relationship between counselors and all students and influence student expectations for future education.

Moss (2015) conducted a study to identify the impact of the CTE program on students after graduation. Five categories of placement after graduation were used: college, employment, postsecondary vocational training, military, and no placement. The results of the study revealed a strong positive relationship between completers of CTE programs and placement in college and employment.

### *CTE and Attaining College Outcomes*

Attempts were made to explore CTE impact on college outcomes. For instance, Dietrich, Lichtenberger and Kamalludeen (2016) conducted a study to explore CTE program impact on community college outcomes. The results of the study suggested that even after controlling for various pre-college and environmental factors, community college students who had participated in a high school CTE program were either just as likely or more likely to attain all of the college outcomes measured in the study (i.e. transfer to a four-year college only; transfer and community college credential: either associate degree or certificate; associate only, as highest credential; certificate only, as highest credential)

### *Exploration of Different CTE Programs*

Previous research made attempts to compare CTE programs nationally and at the global level. Drysielski (2015) conducted a study to compare a suburban CTE program, an urban CTE program, and an international CTE program on 21<sup>st</sup> century skills by evaluating each program's curriculum for select courses. The program curricula from US suburban and urban programs and an international CTE program in Finland were compared. The findings indicated that Finland had a more complete national curriculum that encouraged students to attend vocational schools when compared to the United States.

Pierce and Hernandez (2015) conducted a quasi-experimental study to compare student outcomes in regular CTE courses (control group) to those in CTE courses with reading and mathematics competencies integrated (treatment group). The results of the study suggested that in integrated CTE courses the reading scores of the treatment group improved, but their mathematics scores did not improve.

### *Alignment of CTE and Career Objectives*

For CTE program effectiveness, the alignment of CTE classes with student career objectives and student awareness of it is very important. To explore this, DeFeo (2015) conducted a study with 1,134 vocational high school and comprehensive high school students enrolled in CTE classes to understand why students took CTE classes, what their career aspirations were, whether they knew about career opportunities in CTE fields, and whether or not their career aspirations aligned with their CTE coursework. The results of the study suggested that although vocational high school students' reasons for taking CTE courses were more positive, poor alignment between CTE classes and stated career objectives characterized both groups of students.

### *Impact of CTE on Students Subgroups*

A number of studies were conducted to explore the impact of CTE programs on student subgroups (e.g. gender, ethnicity, disabilities, socio-economic status). For instance, Chadwell (2017) conducted a quantitative study to examine the perceptions of career and technical education (CTE) among high school students based on their socioeconomic status (i.e. high, mid, low) and gender, and the interaction between the two. The results suggested that students with all the three levels of socioeconomic status -both male and female - had no differences in perception; and there was no interaction between gender and socio-economic status.

Fluhr, Choi, Herd, Woo, and Alagaraja (2017) conducted a study to examine the relationship between high school student (9<sup>th</sup> -12<sup>th</sup> grades) gender and CTE course taking, and the combined effects of gender and program area on estimated future wage earnings for male and female CTE completers. The results of the study suggested that gender was a statistically significant predictor of nontraditional course taking pattern, with males taking more nontraditional courses than females and that the effect of gender on estimated future wage earnings was largely dependent on program area. These findings collectively suggested that although gender pattern in CTE course taking still existed, gender wage gap may be decreasing.

Neilson (2016) conducted a qualitative study to get insight into the impact of CTE on Native American male students in North Arizona. The student voices expressed that CTE prepared them to enter college and provided them the skills needed to obtain employment upon graduation, in their field of study. The results also showed that CTE teachers, due to their industry expertise, and specialized technical and college

training, have a sharp impact on the Native American youth in this study. Real world, hands-on experiences in industry-specific classroom labs also have a deep impact on Native American youth.

Gottfried, Bozick, Rose and Moore (2016) conducted a study to evaluate whether two CTE experiences (applied STEM course taking and school-based experiential program) in high school differentially predict the declaration of STEM college majors for students with and without disabilities. Assessing nationally representative data, the analyses suggested that CTE experiences consisting of applied STEM courses and school-based experiential programs may both be sufficient to move through the STEM pipeline for students in the general population but not for students with disabilities.

Lee, Rojewski, and Gregg (2016) conducted a study that revealed significant causal effects of the CTE program for postsecondary work outcomes in adolescents with high-incidence disabilities. High school students identified as CTE concentrators were more likely to be employed full-time after high school completion than non-CTE concentrators earning fewer CTE credits.

Theobald, Goldhaber, Gratz, and Holden (2018) used longitudinal data from Washington State to investigate the relationships among CTE enrollment, inclusion in general education, and high school and postsecondary outcomes for students with learning disabilities. The results of the study suggested that students who had enrolled in CTE concentration had higher rates of employment after graduation than observably similar students with learning disabilities enrolled in fewer CTE courses.

Gogan (2017) conducted a study to investigate how a CTE program impacted the preparedness of students diagnosed with Autism Spectrum Disorder (ASD) for educational and employment opportunities beyond high school. Key findings indicated that the CTE program prepared ASD students for postsecondary educational and employment opportunities, the use of differentiated instruction to meet the individual needs of ASD students, the use of technologies such as computers which helped ASD students prepare for postsecondary educational and employment opportunities, and learning technical skills, life skills, and job skills.

### *CTE Content and Workplace Needs*

A number of studies were conducted to explore the alignment of CTE content with workplace needs. Green (2015) examined the perceptions of community employers and former CTE program students on the skills levels that the job market deemed necessary to be successful in a particular industry. The results of the study suggested that critical thinking and problem solving, effective oral and written communication, agility and adaptability, and collaboration across networks and leading by influence were rated the highest by all employers. However, the employers indicated that the skill level of new hires was significantly lower than what they viewed as important to the success of the organization and lower than what they desired. Program graduates on the other hand, indicated that from their perspective the important skills were those related to locating and analyzing information, the ability to turn ideas into action, and critical thinking and problem solving were vital and very important to their career choice. However, they also mentioned that while they felt better prepared for adapting to different situations and effective oral and written communications, they felt less prepared for critical thinking, problems solving and doing teamwork.

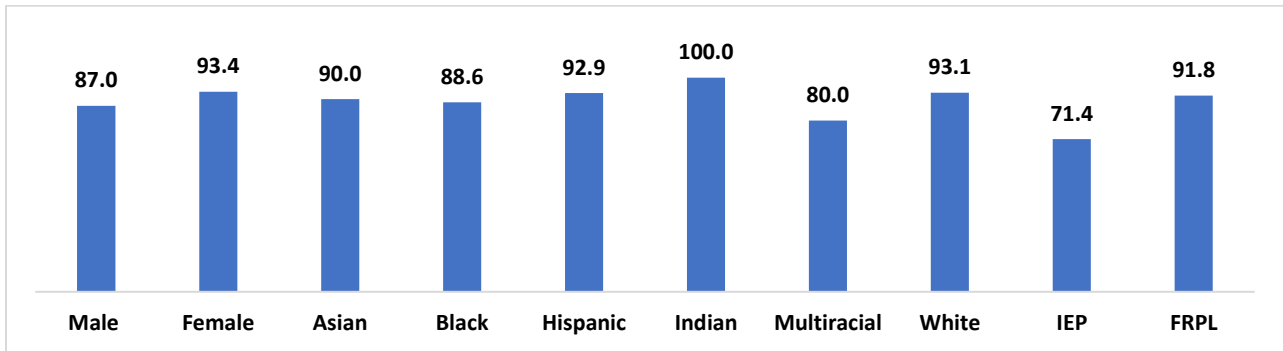
Bartlett, Schleif and Bowen (2011) conducted a study to examine the extent to which CTE related programs used workforce needs assessment as a component of their evaluation activities. The findings showed that only one-half of the ATE projects with a specific CTE occupational focus engaged in workforce needs assessment.

### Research Needs Related to CTE

Kosloski and Ritz (2016) conducted a study to determine topics that needed further research in CTE. Sixteen research needs with descriptions were identified and consensus was achieved on their importance to conducting future research studies. The research needs included 11 items related to high school CTE and 5 items on the preparation for teaching of CTE (e.g. “Determine the optimal balance of occupational, soft, and technical skills needs to best prepare for the workforce” or “Determine the best method of connecting CTE curriculum to workplace skills, to include both occupational and workplace skills”). This source can have utility for those interested in conducting further research on CTE.

### Local News: CTE in Buffalo

The Buffalo Public Schools Career and Technical Education Department offers over 30 programs with at least one in every high school. The programs integrate rigorous academics with relevant career and technical skills as well as, work place attitudes and behaviors. The programs offer interactive learning activities, internship opportunities and real-world experiences in daily learning activities to help students develop work place competencies and/or college options. Based on the information available in the program about CTE students who completed school in 2015-2016, six months after school graduation the following percentage of students by subgroup were either employed or in secondary education. The numbers( *Figure 1*) are an aggregate of responses received to surveys, and other modes of communication. Many students did not respond to the communication that the program initiated.



*Figure 1: Percentage of BPS CTE Program Graduates Employed or in Secondary Education*

### Conclusion

Previous research reported that being instructed in a CTE program is beneficial both for students with and without disabilities. Participation in CTE programs in both groups relates to better academic achievement and securing employment. There is evidence that CTE programs are also beneficial for subgroups, and the report received from Buffalo Public Schools fills the gap on some subgroups. Differences have been reported between CTE programs and there is empirical evidence of poor alignment between CTE class and career objectives, along with CTE content and workplace needs which can be an area of focus in future research.

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