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AIR

Sometimes Less, Sometimes More: Trends in Career and Technical Education Participation for Students With Disabilities

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Abstract

We leverage nationally representative data and statewide data from Washington to investigate trends in occupational career and technical education (CTE) participation for students with and without disabilities. Consistent with prior work, we document declines in occupational CTE participation since the early 2000s, and provide the first empirical evidence that students with disabilities disproportionately contributed to this decline. But we also show that occupational CTE participation has stabilized for all students in the past decade in Washington, and that participation by students with disabilities in applied science, technology, engineering, mathematics, and medicine (applied STEMM) CTE courses has increased since the early 2000s. These trends are encouraging given prior evidence linking applied STEMM-CTE participation to better long-term outcomes for students with disabilities.

Introduction

Recent educational research has connected participation in career and technical education (CTE) to better long-term outcomes for students with disabilities (e.g., Haber et al., 2016; Mazzotti et al., 2016; Test et al., 2009). Importantly, emerging evidence suggests that these relationships persist after controlling for baseline (i.e., demographic and academic) differences between students who do and do not participate in CTE. For instance, both national-level (e.g., Lee, Rojewski, & Gregg, 2016; Wagner, Newman, & Javitz, 2016) and state-level (e.g., Dougherty, Grindal, & Hehir, 2018; Theobald, Goldhaber, Gratz, & Holden, 2019) analyses have demonstrated that students with disabilities who take more CTE courses in high school are more likely to graduate and be employed within 2 years of graduation compared with similar students with disabilities who take fewer CTE courses. Moreover, consistent with theory suggesting that the "applied" nature of CTE courses is better suited for engaging students with disabilities (Brigham, Scruggs, & Mastropieri, 2011; Jenson, Petri, Day, Truman, & Duffy, 2011), recent research has connected participation in applied science, technology, engineering, mathematics, and medicine (applied STEMM) CTE coursework to improved educational attainment for students with learning disabilities in particular (Plasman & Gottfried, 2018).

Given the above findings and growing interest over the past two decades in promoting both CTE and STEMM coursework (e.g., American Federation of Teachers, 2014; Committee on Prospering in the Global Economy of the 21st Century, 2007; National Research Council, 2000), it is critical to document who participates in CTE and in what types of courses. Older evidence suggests that enrollment in CTE by students with disabilities declined substantially across the 1990s and early 2000s (Wagner, Newman, & Cameto, 2004). And more recent evidence, focusing on all high school students, documented a 14% decline in CTE enrollment between 1990 and 2009, while the average number of earned academic credits increased during the same period (e.g., Hudson, 2013). Yet in the most recent decade, a new pattern has emerged in some states. For example, Dougherty and Harbaugh Macdonald (2019) used data from Massachusetts to document variation in these trends for different CTE occupational areas and found that CTE participation is once again on the rise, particularly in CTE areas aligned with STEMM.

There is no single explanation for these patterns of CTE participation. Yet, these trends have played out against the backdrop of several major national educational policies that may have influenced participation in CTE, particularly for students with disabilities. On the one hand, the No Child Left Behind Act of 2001 (NCLB) placed greater emphasis on academic performance and course-taking, and potentially created greater incentives for enrolling in academic (i.e., non-CTE) courses for students with disabilities via the creation of a formal subgroup for these students for accountability purposes. The existing evidence documenting increasing academic coursework alongside decreasing CTE participation for students with disabilities in the early 2000s (e.g., Wagner et al., 2004) is consistent with the notion that accountability for students' academic outcomes may have been important in increasing academic coursetaking and decreasing CTE participation.

On the other hand, as noted above, there is some evidence of a more recent rise in CTE participation. This finding might be best explained by the reauthorization of the Individuals with Disabilities Education Act (IDEA) in 2004, and the passage of the Carl D. Perkins Career and Technical Education Act in 2006. The 2004 IDEA reauthorization placed a greater emphasis on training and employment and contains provisions that require equal access to CTE courses for students with disabilities. And the Perkins IV Act in 2006 provided considerable increased funding for CTE and mandated that states develop "services and activities that integrate rigorous and challenging academic and career and technical instruction" (Carl D. Perkins Career and Technical Education Act, 2006). Notably, a key provision of Perkins IV was an increased emphasis on increasing the participation of "special populations," of which students with disabilities are one group, particularly in CTE coursework providing students with technical skills in STEMM areas (Plasman & Gottfried, 2018).

Numerous recent changes to state graduation requirements intended to encourage CTE participation are also consistent with a recent uptick in CTE participation. For example, in 2013 Wisconsin allowed students to earn math and science credit through CTE and computer science courses. In 2014, Arizona allowed computer science courses to meet math requirements for graduation. In the same year, Illinois approved AP Computer Science (which is an applied STEMM CTE course) to substitute for required math courses.

To be clear, we cannot say that the Perkins Act, the IDEA reauthorization, or changes in state graduation requirements can be causally linked to trends in CTE participation, but all of these legislative changes do encourage students to take more CTE courses and correspond to the uptick in CTE participation. And while we know that CTE participation has increased recently, we are aware of only one study (Dougherty & Harbaugh Macdonald, 2019) that has investigated trends in CTE participation within the past decade and within different CTE occupational areas. This study does not evaluate nationally representative data, nor does it focus on trends in CTE participation students with disabilities. Instead, this prior study suggests students with disabilities are overrepresented in CTE and underrepresented in STEMM, though not when conditioning on test scores, which they note is consistent with results in Morgan et al (2015) about the importance of controlling for prior measures of learning when considering racial disproportionality in disability identification.

There are good reasons to focus on trends in CTE participation, especially over the past decade and with a particular focus on students with disabilities. Trends since 2010 are particularly important to understand given that sentiment around CTE is changing, due both to changes in state-level policy (Jacob, 2017) and significant media attention about 21st century CTE not being "your father's vocational education" (e.g., Zinth, 2013). The 2015 passage of the Every Student Succeeds Act of 2015 may also have led to different trends in CTE participation than its predecessor, NCLB. Moreover, a more complete picture of CTE participation for students with disabilities and by CTE area provides important policy evidence to inform CTE programming, given that this group of students that may differentially benefit from CTE, particularly in specific areas (e.g., applied STEMM).

We therefore build on limited prior research and investigate trends in CTE participation using data from three sources: nationally representative data from high school students between 2000–01 and 2003–04 from the Education Longitudinal Study (ELS); nationally representative data from high school students between 2009–10 and 2012–13 from the High School Longitudinal Study (HSLS); and a state census of all high school students between 2009–10 and 2017–18 from Washington State (that provide data on recent years not currently available in nationally representative data sets). Together, these data sets include the complete high school records of students with expected graduation dates in 2003–04 and 2012–13 from nationally representative data and between 2012–13 and 2017–18 from Washington data, and allow us to investigate trends separately for students with disabilities and students without disabilities. We use these data sets to address two research questions:

1. How has the average number of CTE credits taken during high school changed over time for students with learning disabilities compared to (a) students with other types of disabilities and (b) students with no identified disabilities?
2. How do these trends vary within different CTE occupational areas?

There are two motivations for the focus on students with learning disabilities in research question 1. First, students with learning disabilities make up the largest group of students served under IDEA (U.S. Department of Education, 2019). In fact, no other group compares with the size of those with learning disabilities; the second largest group is merely half the size of the group with learning disabilities. Hence, those with learning disabilities represent an important group to study on its own. Second, as mentioned, prior research on CTE participation for students with learning disabilities has shown a positive link between course-taking and subsequent outcomes. Given this, it would behoove the field to have a more in-depth understanding of whether a group of students which has been shown to benefit from taking these courses are indeed poised to do so. Comparing this group to other groups of students with disabilities as well as to students without disabilities provides a reference point for relative growth and changes to CTE participation patterns.

Method

Sources of Data

As mentioned above, this study used data from three sources: the ELS and the HSLS, collected by the National Center for Education Statistics, and Washington state administrative data. ELS followed a nationally representative group of more than 16,000 students who were sophomores in the spring of 2002 through high school into postsecondary education and into careers. Students completed surveys during the base year in 2002, and high school transcripts were added in 2005. HSLS tracked a nationally representative group of more than 23,000 students beginning during the fall of their freshman year in 2009. Students completed surveys at this time, and high school transcripts were added in 2014. Washington data come from Washington State's Comprehensive Education Data and Research (CEDARS) system that provides a census of student course taking records for the more than 80,000 students in each cohort in the state.

Sample

To create consistent samples across our three sources of data, we focused on students who entered ninth grade in a particular year and remained in school for the next 3 years (i.e., until their expected year of graduation). We refer to these cohorts on the basis of their expected graduation dates. For example, the 2003–04 cohort consists of all students who entered ninth grade in 2000–01 and remained in school for 2001–02, 2002–03, and 2003–04 (note that this definition does not require students to remain on target for graduation or graduate on time, just that they were in school for those years). The years of available data allowed us to observe a nationally representative group of students for the 2003–04 cohort from the ELS data, a nationally representative 2012–13 cohort from the HSLS data, and a complete census of the 2012–13 through 2017–18 cohorts from the Washington data.

A key focus of this study was examining differences in course-taking patterns for three groups of students: students with identified learning disabilities, students with other identified disabilities, and students without identified disabilities. In the ELS/HSLS data sets, it was possible to identify disability status and category based on the base year survey IEP information provided by a student's school and on a student's official school records. In the CEDARS data, we created these indicators from records of the disability code for which students were receiving special education services in ninth grade (to be consistent with the coding scheme in the ELS/HSLS data sets).

CTE Participation Measures

We identified the area of CTE using records that identify courses with codes from the Classification of Secondary School Courses for ELS and the School Courses for the Exchange of Data (SCED) system for the other two datasets. We use these codes to identify all "occupational CTE courses," which we define as those providing students with skills specific to a certain labor market field. We also use these codes to identify the CTE category of each course: agriculture and natural resources, applied STEMM (including medical courses as discussed below), business, communications, trades, public services, and human services.

We follow Dougherty and Harbaugh Macdonald (2019) and classify medical and health courses as applied STEMM. This makes sense because many of these courses require prior knowledge in STEM and tend to be technical; for example, participation in nursing programs tends to require coursework in anatomy, physiology, and biology. Dougherty and Harbaugh Macdonald (2019) also noted that medical and health courses also tend to have stackable credentials and vertically integrated pathways, which are common in many STEM fields. Our results for applied STEMM are not sensitive to the inclusion of these courses. The other CTE categories are based on previous work exploring CTE participation patterns (Plasman, Gottfried, & Sublett, 2017, 2019).

A key assumption in this analysis is that changes in average CTE credits across different years and data sets in this analysis reflect true changes in CTE participation patterns and not just the "relabeling" of existing CTE courses (e.g., "business math" courses being identified as "business" in early years and "applied STEMM" in later years). We find little evidence in the data (either between ELS and HSLS data sets or within the Washington CEDARS data) of courses with the same name being assigned different SCED codes in different years, but we also have relatively little ability to test for this possibility given the lack of consistent course naming conventions in these datasets. We therefore caution that the trends we document reflect both true changes in CTE participation and, to the extent that this occurs, any "relabeling" of CTE courses across different years of data. It is worth mentioning that while this likely plays little role in the observed changes, this potential relabeling may be a particular concern in the analysis of the ELS and HSLS data, given that only the HSLS data include an "Other" category that might include some courses coded into specific CTE clusters in the ELS data.

Our primary measure of CTE participation was the average number of credits taken in occupational CTE courses over the 4 years of high school. This was informed by several facts about CTE. First, virtually all students (more than 95%) were enrolled in at least one CTE course during high school; in fact, one credit of CTE is a requirement for graduation in Washington and thus provides little information about student interest or programmatic CTE enrollment. Second, credits completed allowed us to capture the extent of participation in CTE course areas. This is important because some prior research finds concentrated CTE participation is predictive of improved student outcomes for students with disabilities (Lee et al., 2016; Theobald et al., 2019; Wagner et al., 2016). Third, occupational education focuses on courses in identified CTE clusters that provide specific labor market preparation designed to provide students with skills that are unique to a given occupational area. To ensure consistency across different data sources, we converted all course credits to Carnegie Units (e.g., a student taking one CTE course for one semester would receive 0.5 Carnegie Units for this course) and refer to Carnegie Units as "credits" for the remainder of this analysis.

Analytic Approach

We calculated the average number of occupational CTE credits taken in high school (research question 1) and within different CTE areas (research question 2) for the 2003–04 and 2012–13 cohorts from the nationally representative data ("National Data"), and the 2012–13 through 2017–18 cohorts from the state census of students in Washington ("Washington Data"). Within each cohort, we report trends for three mutually exclusive groups of students: students with learning disabilities, students receiving special education services for different disabilities, and students without an identified disability.

There were two remaining concerns in this approach. First, ELS/HSLS and CEDARS used different methods for classifying CTE courses. Second, ELS and HSLS data were nationally representative samples, whereas Washington data is not nationally representative. In both cases, we were able to use the one year in which we have perfect overlap between the years of available Washington data and the HSLS data to address these concerns. Specifically, we were able to explore differences in CTE course coding between HSLS and the Washington data by using a subsample of the HSLS that includes roughly 1,000 students from Washington in the HSLS 2012–13 cohort—which was one of the states for which HSLS provides a representative state-level sample—and comparing results from this subsample to the population of Washington students in the CEDARS 2012–13 cohort. We also used data on the 2012–13 HSLS cohort and 2012–13 Washington cohort to highlight where national and Washington participation levels diverged.

Results

Research Question 1

Figure 1 addresses research question 1 and reports trends in the average number of occupational CTE credits taken during high school by students without disabilities, students with learning disabilities, and students receiving special education services for different disabilities in each cohort and data set. We draw three primary conclusions from this figure. First, note that the average number of occupational CTE credits declined by about 15% for both groups of students with disabilities between the 2004 and 2013 graduation classes but did not decline for students without disabilities. This suggests that students with disabilities disproportionately contributed to the observed decline in participation rates during the 2000s, as confirmed and documented in prior research; in fact, we calculate that about half of this overall decline can be explained by changes in the CTE participation of students with disabilities, despite the fact that students with disabilities represented just 13% of all public school students during these years.

We are not aware of prior evidence showing that the occupational CTE participation during this time period declined primarily for students with disabilities (and stayed relatively consistent for students without disabilities). But the trends we identify are certainly consistent with prior evidence on the declines in general CTE participation (Hudson, 2013; U.S. Department of Education, 2009; Digest of Education Statistics, 2003, p. 163), and for students with disabilities in particular (Wagner et al., 2004).

Second, the data from the one year of overlap between the National and Washington datasets suggest that Washington is broadly representative of national CTE participation patterns in this year, though we caution that this does *not* imply that trends in the later years of Washington data also reflect trends nationally. That said, at least in Washington, our third finding is that the average number of occupational CTE credits is relatively consistent for all three groups of students in the 2012–13 through 2017–18 cohorts; importantly, we do *not* observe a continued decline in overall occupational CTE participation for students with learning disabilities in Washington after 2013. The overall trends are broadly consistent with state-level evidence from Massachusetts (Dougherty & Harbaugh Macdonald, 2019) that actually documents a modest increase in CTE participation over a similar time period, though we are not aware of recent evidence on CTE participation specifically for students with disabilities.

Research Question 2

Figure 2 addresses research question 2 and investigates variation in these trends by occupational CTE area. Indeed, we find that the trends in Figure 1 obscure important variation by occupational CTE area. Most notably, while the decline in occupational CTE participation for students with disabilities between the 2003–04 and 2012–13 cohorts is clearly driven by sharp decreases in the average number of credits taken in areas like agriculture and natural resources, business, human services, and trades—and the decline in trades participation is particularly stark for students receiving special education services for non-learning disabilities—the average number of applied STEMM credits taken by students with disabilities actually increased during this same period. For example, between the 2003–04 and

2012–13 nationally representative cohorts, the average number of applied STEMM credits increased by about 30% for students with learning disabilities and by almost 50% for other students receiving special education services. We believe this is the first evidence of these patterns using nationally representative data for students with disabilities.

This increase in applied STEMM participation continues through 2017–18 when we focus on the Washington data over the past 5 years. This finding is consistent with the increase in CTE STEMM participation documented in Massachusetts by Dougherty and Harbaugh Macdonald (2019), although we build on this prior work by illustrating that these trends hold for students with disabilities as well. Specifically, the average number of applied STEMM credits increased by about 15% to 25% for students in each subgroup in Washington between the 2012–13 and 2017–18 cohorts.

Discussion

The trends in CTE participation documented in this analysis lead to some clear conclusions. Consistent with earlier research, we find that students in the past decade are taking fewer occupational CTE courses, on average, than they were in the early 2000s. As discussed in the Introduction, this overall trend is consistent with the hypothesis that federal policies (and national sentiment around education) may have placed an increased emphasis on academic coursework over occupational CTE coursework, and we are witnessing the long-term effects of this emphasis. However, it does not explain why declines in occupational CTE participation are disproportionately driven by declining participation by students with disabilities, unless the subgroup accountability requirements in NCLB were particularly influential for students with disabilities. Further research could attempt to disentangle the various reasons why occupational CTE participation might have declined so sharply for students with disabilities during this time period.

We also find differences in occupational CTE participation patterns across different areas. Most notably, participation in applied STEMM increased across the entire period we consider, which may reflect a larger trend that deemphasizes traditional vocational education in favor of more technical areas such as science and math (Benavot, 1983; Young, 2008). The increases in applied STEMM participation are also consistent with mandates in Perkins IV to expand technology use in CTE and prepare students for high-demand occupations (Dougherty & Harbaugh Macdonald, 2019), so these trends could also reflect changes in federal CTE policy that shifted resources toward these occupational CTE areas.

The implications of these trends are less clear. Recent evidence has linked concentrated CTE participation to improved graduation and employment for students with disabilities (Lee et al., 2016; Theobald et al., 2019; Wagner et al., 2016), so while this earlier research is not causal in nature, the declining participation in CTE by students with disabilities documented in this study could be interpreted as bad news for policymakers and educators who want to improve these outcomes for students with disabilities. On the other hand, the one area that experienced an increase in CTE participation by students with disabilities, applied STEMM, is precisely the area of CTE targeted by Perkins IV for increased involvement by all students, with a particular focus on increasing participation by students with disabilities as a "special population." Furthermore, previous research has linked applied STEMM participation to improved outcomes, including odds of graduation and odds of postsecondary enrollment, specifically for students with disabilities (Plasman & Gottfried, 2018).

The trends documented in this study are also consistent with a separate goal of the Perkins IV legislation to increase participation in applied STEM areas of study (those CTE clusters that focus on technical skills in math and science) in an effort to improve college and career readiness. However, it is worth considering whether this push is coming at the expense of other CTE clusters. Although STEMM careers (particularly in the health field) do make up a large percentage of predicted job openings over the next decade, it is also important to consider the needs of the skilled trades labor market as well as the business sector. Both these areas are also expected to see substantial growth, as well as gaps in labor availability, in the next decade. These fields should not be forgotten and pushed aside when considering CTE in general.

Finally, states play a very clear role in boosting participation in CTE through special education policy. As mentioned, Washington, among other states, has enacted policies requiring students to participate in CTE in order to meet the graduation prerequisites. In some states, the CTE participation requirement is for any CTE cluster, while in many states the emphasis is on STEMM courses. Further efforts may look to align policies across various stakeholder levels in order to encourage participation and persistence in the CTE clusters most vital in a given region, and to work more diligently to increase participation for students with disabilities. Thus, we encourage future research that seeks to disentangle the competing implications of these trends for students with disabilities.

References

American Federation of Teachers (2014). Re-envisioning career and technical education. *American Educator*, Fall 2014.

Benavot, A. (1983). The rise and decline of vocational education. *Sociology of Education*, 63–76.

Brigham, F. J., Scruggs, T. E., & Mastropieri, M. A. (2011). Science education and students with learning disabilities. *Learning Disabilities Research & Practice*, *26*(4), 223–232.

Carl D. Perkins Career and Technical Education Act of 2006, Pub. L. No. 109–270 (2006).

Committee on Prospering in the Global Economy of the 21st Century (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, DC: National Academies Press.

Dougherty, S. M., Grindal, T., & Hehir, T. (2018). The impact of career and technical education on students with disabilities. *Journal of Disability Policy Studies*, 29(2), 108–118.

Dougherty, S. M., & Harbaugh Macdonald, I. (2019). Can growth in the availability of STEM technical education improve equality in participation? Evidence from Massachusetts. *Journal of Vocational Education & Training*, 1–24.

Every Student Succeeds Act of 2015 (ESSA), Pub. L. No. 114–95 (2015).

Haber, M. G., Mazzotti, V. L., Mustian, A. L., Rowe, D. A., Bartholomew, A. L., Test, D. W., & Fowler, C. H. (2016). What works, when, for whom, and with whom: A meta-analytic review of predictors of postsecondary success for students with disabilities. *Review of Educational Research*, *86*(1), 123–162.

Hudson, L. (2013). *Trends in CTE Coursetaking*. Data point (NCES 2014-901). Washington, DC: National Center for Education Statistics.

Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. §612 (2004).

Jacob, B. A. (2017, October 5). *What we know about career and technical education in high school*. Retrieved from https://www.brookings.edu/research/what-we-know-about-career-and-technical-education-in-high-school/

Jenson, R. J., Petri, A. N., Day, A. D., Truman, K. Z., & Duffy, K. (2011). Perceptions of self-efficacy among STEM students with disabilities. *Journal of Postsecondary Education and Disability*, *24*(4), 269–283.

Lee, I. H., Rojewski, J. W., & Gregg, N. (2016). Causal effects of career-technical education on postsecondary work outcomes of individuals with high-incidence disabilities. *Exceptionality*, *24*(2), 79–92.

Mazzotti, V. L., Rowe, D. R., Sinclair, J., Poppen, M., Woods, W. E., & Shearer, M. L. (2016). Predictors of post-school success: A systematic review of NLTS2 secondary analyses. *Career Development and Transition for Exceptional Individuals*, *39*(4), 196–215.

Morgan, P. L., Farkas, G., Hillemeier, M. M., Mattison, R., Maczuga, S., Li, H., & Cook, M. (2015). Minorities are disproportionately underrepresented in special education: Longitudinal evidence across five disability conditions. *Educational Researcher*, *44*(5), 278-292.

National Research Council (2011). *Successful K-12 STEM education: Identifying effective approaches in science, technology, engineering, and mathematics*. Washington, DC: The National Academies Press.

No Child Left Behind Act of 2001 (NCLB), Pub. L. No. 107–110, 115 Stat. 1425 (2002).

Plasman, J. S., & Gottfried, M. A. (2018). Applied STEM coursework, high school dropout rates, and students with learning disabilities. *Educational Policy*, *32*(5), 664–696.

Plasman, J. S., Gottfried, M. A., & Sublett, C. (2017). Are there academic CTE cluster pipelines? Linking high school CTE coursetaking and postsecondary credentials. *Career and Technical Education Research*, *42*(3), 219–242.

Plasman, J. S., Gottfried, M. A., & Sublett, C. (2019). Is there a career and technical education coursetaking pipeline between high school and college? *Teachers College Record*, *121*(3), 1–32.

Test, D. W., Mazzotti, V. L., Mustian, A. L., Fowler, C. H., Kortering, L., & Kohler, P. (2009). Evidence-based secondary transition predictors for improving postschool outcomes for students with disabilities. *Career Development for Exceptional Individuals*, *32*(3), 160–181.

Theobald, R. J., Goldhaber, D. D., Gratz, T. M., & Holden, K. L. (2019). Career and technical education, inclusion, and postsecondary outcomes for students with learning disabilities. *Journal of Learning Disabilities*, *52*(2), 109–119.

U.S. Department of Education. (2019). *Children and youth with disabilities*. Retrieved from https://nces.ed.gov/programs/coe/indicator_cgg.asp

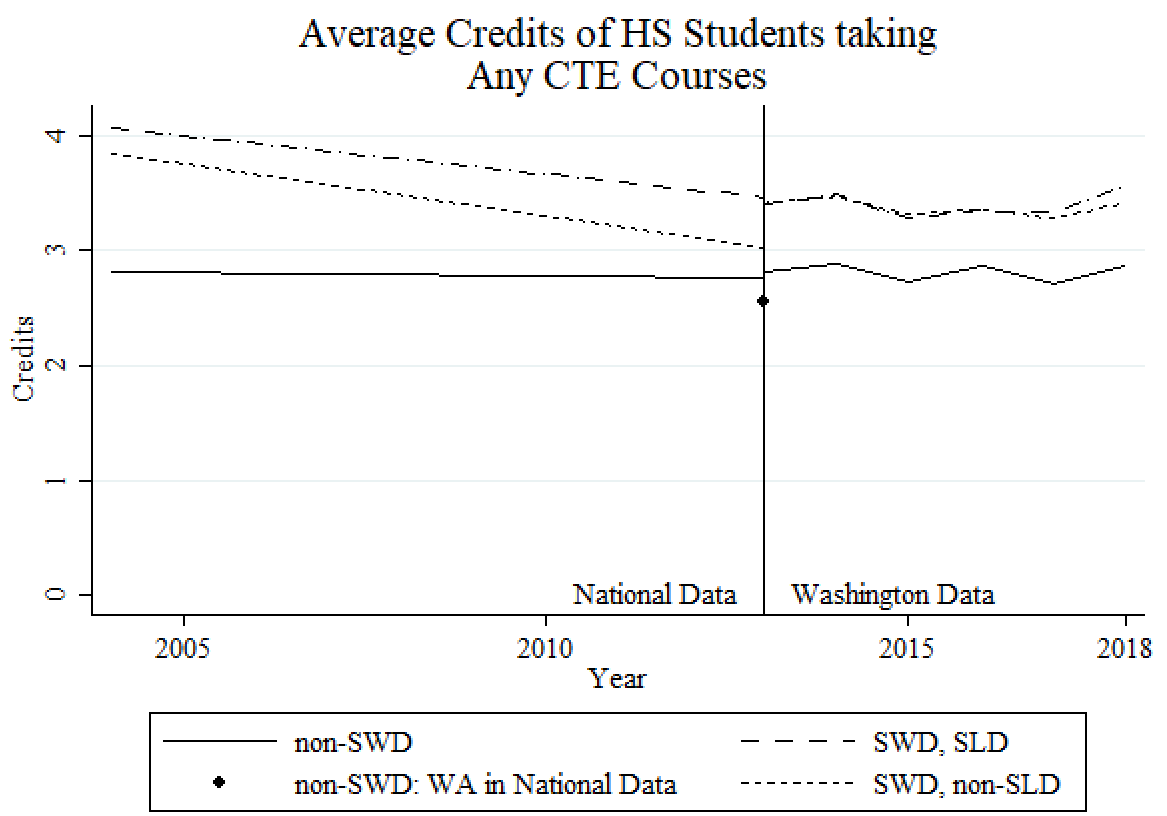
Wagner, M. M., Newman, L. A., & Javitz, H. S. (2016). The benefits of high school career and technical education (CTE) for youth with learning disabilities. *Journal of Learning Disabilities*, *49*(6), 658–670.

Wagner, M., Newman, L., & Cameto, R. (2004). *Changes over time in the secondary school experiences of students with disabilities. A report of findings from the National Longitudinal Transition Study (NLTS) and the National Longitudinal Transition Study-2 (NLTS2).* Online Submission.

Young, M. (2008). From constructivism to realism in the sociology of the curriculum. *Review of Research in Education*, *32*, 1–28.

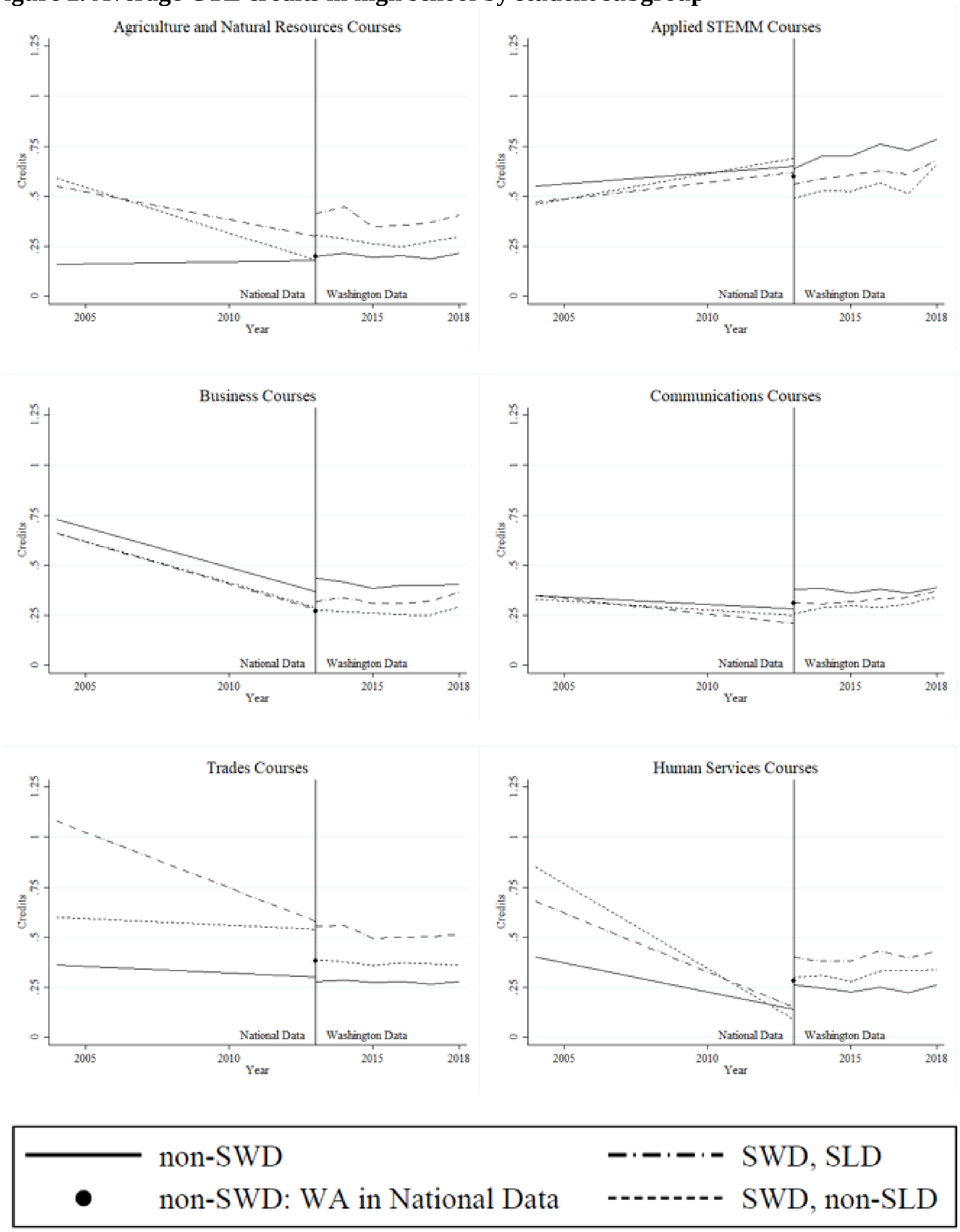
Zinth, J. (2013). Career/technical education: Not your father's vocational education. *The Progress of Education Reform* 14(1), 1-7.

Figure 1. Average CTE credits in high school by student subgroup



Note. SWD = Students with disabilities; SLD = specific learning disability. Estimates for each year are calculated across all 4 years of high school for students expected to graduate in that year.

Figure 2. Average CTE credits in high school by student subgroup



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