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PROMOTING EQUITY THROUGH CTE: ADDRESSING DATA CHALLENGES TO HELP MORE STUDENTS ACCESS BENEFITS

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In Delaware, Career and Technical Education (CTE) prepares students for life beyond high school by providing practical labor skills, workforce credentials, and early post secondary credits. Some CTE students graduate with the distinction as a concentrator, meaning they complete required coursework in a specific career pathway, such as engineering & technology, health informatics, or marketing. While graduating as a concentrator benefits students in terms of job placement and wages after high school, identification of students as concentrators varies across the country. We partnered with the Delaware Department of Education (DDOE) to understand the state's identification strategies and to see if inequities in identification exist that could prohibit students from accessing the benefits of concentrating. We found modest mismeasurement in concentration status, as well as some inequities in which student subgroups become a concentrator. In this policy brief, we share details on findings and strategies for improving equity in CTE.

Students Benefit from CTE Programming

CTE provides high school students opportunities during the school day to explore career pathways while building skills transferable to the workplace. Students who participate in CTE have greater likelihood of graduating high school within four years (Dougherty, 2018; Kulick, 1998), as well as higher predicted earnings that persist 7 years beyond high school graduation (Ecton & Dougherty, 2023). CTE can also promote equitable outcomes, as it particularly benefits Black and Latino youth, youth with disabilities, youth from lower-income backgrounds, and youth who score lower on eighth grade assessments in terms of anticipated wages after high school and postsecondary enrollment (Ecton & Dougherty, 2023).

Students who deepen their CTE participation by completing the required coursework to concentrate in a specific career pathway, such as engineering & technology or marketing, see even greater benefits than students who do not concentrate. We refer to these students as **concentrators**. CTE program concentrators have greater high school graduation rates than those who do not concentrate (Carruthers et al., 2020), are more likely to be employed full time 8 years after graduation, and have greater median earnings 8 years after high school graduation (U.S. Department of Education, 2019). Further, concentrators with disabilities are also more likely to graduate, obtain competitive employment, and earn higher wages after high school (Carruthers et al., 2020; Wagner et al., 2016).

CTE in Delaware

In Delaware, over 60% of students in grades 7-12 participate in CTE (Delaware Advisory Council on Career and Technical Education, 2023). By comparison, about 49% of students participate in CTE nationally (Association for Career and Technical Education, 2021; National Center for Education Statistics, 2019). Delaware has invested ample resources in enhancing CTE programming to prepare students for the workforce, such as establishing an [Advisory Council](#) and the [Delaware Pathways Promise](#). Given the state's priority for CTE, it is important to ensure all students equitably access programming so that they can benefit from the investment.

CTE Identification and Measurement

While concentrating in a CTE career pathway benefits students beyond general CTE participation, federal guidance does not provide a uniform definition of how states should classify students as concentrators (Association for Career and Technical Education, n.d.). States take different approaches to identifying concentrators that consider the course credits students complete. Without federal guidance for what constitutes a concentrator, states are left to determine what level of CTE participation is “enough” for students, as well as the best approach for statewide measurement. Given the benefits students see when concentrating, it is important that as a state we use a common approach to identifying students' concentrator status to ensure opportunities and benefits are available regardless of the school or district a student attends.

Delaware Historically Identified Concentrators at the Local Level

Delaware considers students a concentrator [if they participate in two or more sequenced CTE courses within a career program of study](#). **When we began our study, identification of concentration status occurred at the local level**, meaning district staff reported if a student met the requirements necessary to be a concentrator. While this method allowed districts to account for unique circumstances of the student, such as whether the student transferred into the state with CTE credits, it also may have led to misclassification of student concentrators who should have otherwise been included. For example, students with the requisite course records might not have been correctly identified by school and district personnel responsible for inputting this information, for reasons such as human error or potential biases that result in systematically under-identifying minoritized or economically disadvantaged groups of students or systematically over-identify less marginalized groups of students. Systematic bias has been commonly identified in education settings where determinations about an individuals' status or eligibility for an opportunity are made without clear guidance or accountability, resulting in groups of students being denied or given advantages based on their gender, race/ethnicity, or their linguistic, socioeconomic, or ability status. This raises concerns for students, as missing out on concentration status may also mean missing out on the benefits of being a concentrator, such as listing this classification on job and college applications.

In the 2020-21 school year, the state transitioned to a hybrid system of concentration identification. In this system, a centralized data system first classifies students as concentrators based on their course records. Then, districts are able to supplement the data system's classification by listing a student as a concentrator if they were not previously designated. Upon this transition in identification strategy, DDOE asked us to evaluate this new hybrid system and compare it to the previous one, with a focus on whether inequities existed in the how districts across the state identified concentrators.

Student's Concentration Status is Modestly Mismeasured in Delaware

To assess this possibility, UD and DDOE collaborated to analyze student-level coursetaking data to determine how frequently students' concentration status based on their courses aligned with the concentration status assigned by the district. We found that districts correctly identified a majority of students (84%). This means districts did a good job for most students in capturing their CTE participation. However, this left a modest amount of misclassification across the state, where **16% of students were incorrectly identified in their CTE participation**. Among all students, 5% of students were *exaggerated* as a concentrator, meaning the district designated the student as a concentrator despite their course taking behavior not showing evidence of completing the required coursework. Schools or districts may have had information about these students not in the course records, such as out-of-state transcripts or information provided by the parents. Though there is some risk that more traditionally advantaged students may be designated as concentrators despite not having course records to prove it, this is a relatively small concern given how much more information schools and district staff have about their students.

More consequentially, 11% of students were missed, meaning they had actually earned a concentrator designation by taking required courses but did not receive that designation by the district. This means that even though the student completed the required courses in the state, they did not graduate as a "concentrator," and may have missed out on the benefits that concentrating affords them later in life (such as enrollment in postsecondary institutions, job placement, and higher wages after graduation).

Students who are low-income or have IEP or ELL designations are more likely to have their concentrator status missed

To better understand whether there are systemic biases in who is classified as a concentrator - and therefore who can benefit from that status - we examined if certain student subgroups (meaning students who fall into different classifications of gender, race/ethnicity, disabilities, low-income, and english language learners (ELL)) were more or less likely to be a concentrator, and if they were more or less likely to be misclassified.

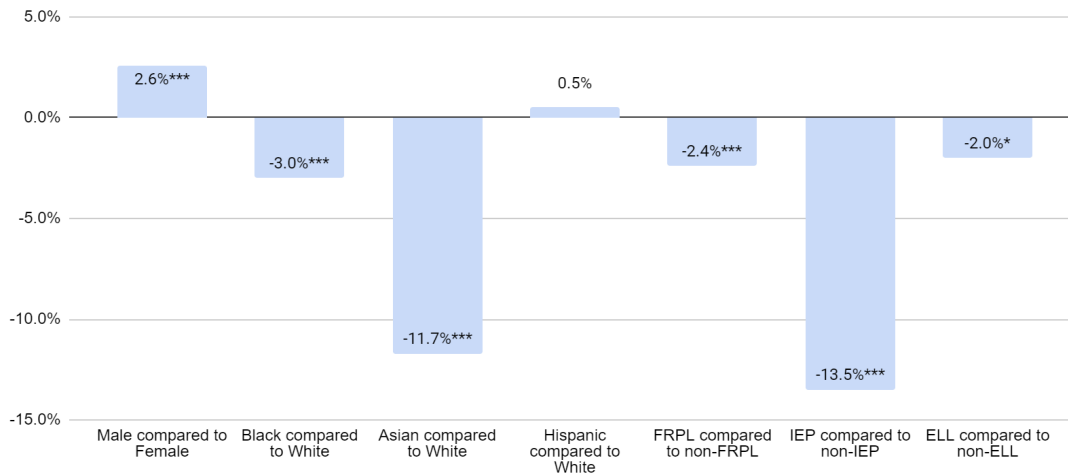
Concentrator status wasn't distributed evenly across student subgroups. We found that males were more likely to be concentrators than females, and some student subgroups were less likely to be concentrators than their counterparts, including black students as compared to white students; asian students as compared to white students; students who are low-income as compared to students who are not; students with IEP as compared to students without IEPs; and students in ELL programs as compared to students not in ELL programs (Figure 1). This may mean that there were barriers to concentrator status that impacted some groups more than others, creating inequitable access and participation.

Exaggerated status did not indicate systematic inequity. When examining if certain student subgroups were more or less likely to be misclassified, we saw little evidence that students were systematically *misclassified* as concentrators when course records indicated otherwise. The only student subgroup *more likely* to be exaggerated, or identified as a concentrator when they did not complete the aligned coursework, was students who are low-income as compared to students who are not (Figure 2). Therefore misclassification that exaggerates status did not seem to advantage or disadvantage any particular subgroup of students.

Some students systematically missed out on concentrator status. Conversely, and more problematically inequitable, we found that students who were more likely to be *missed as a concentrator* included: males as compared to females; students who are low-income as compared to students who are not; students with IEPs as compared to students without IEPs; students in ELL programs as compared to students not in ELL programs; and white students as compared to Asian students. These results indicated that **certain student subgroups – particularly students who are low income, and those who have IEP or ELL designations – were more likely to have their earned concentrator status missed by the district.** This raises specific concerns as these students may have systematically missed out on the benefits of concentrating

Figure 1.

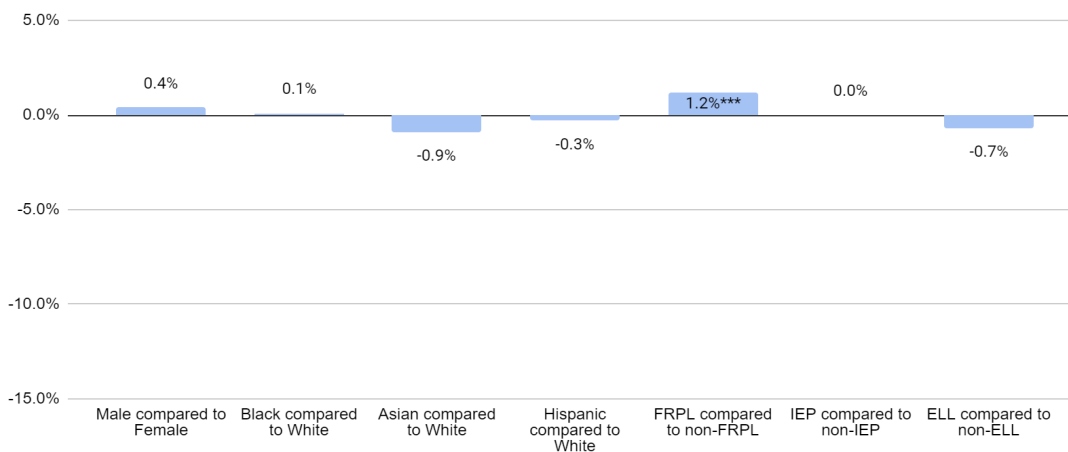
Likelihood of Being a Concentrator by Student Subgroups



Note. *** $p < 0.001$; * $p < 0.05$

Figure 2.

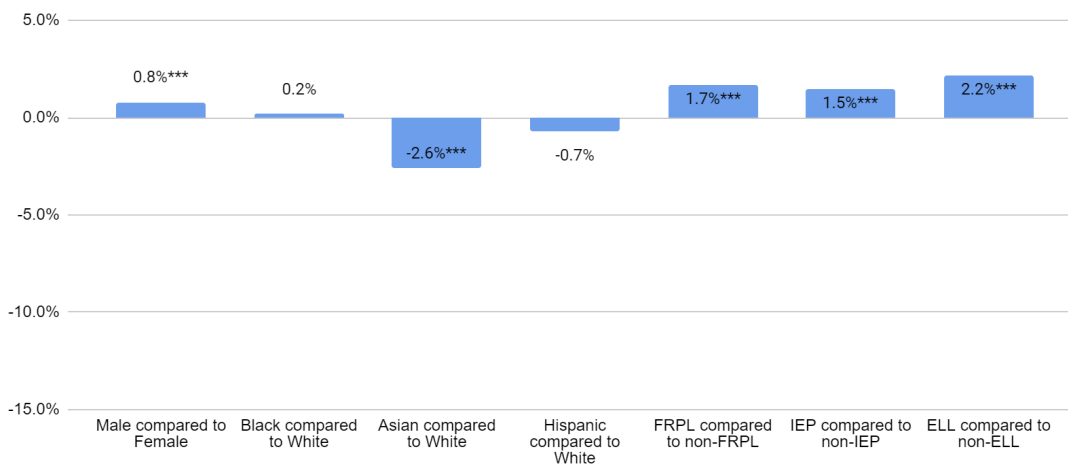
*Likelihood of Being **Exaggerated** as a Concentrator by Student Subgroups*



Note. *** $p < 0.001$

Figure 3.

*Likelihood of Being **Missed** as a Concentrator by Student Subgroups*



Note. *** $p < 0.001$

Steps to Ensuring Equitable Access to Benefits of Concentrating

For students to equitably access and benefit from concentrator status, a different approach to designating concentrator status was needed. In Delaware, a student's concentration status has been historically determined by the district. District determination has important benefits for ensuring equitable participation and valuing students' prior experiences, including the ability to more easily take into account students' unique circumstances (e.g. out-of-state records) or experiences (e.g. credit for informal learning opportunities such as caring for a family farm). However, as we found, district determination can result in systematic misidentification in this approach across student subgroups. As we showed in our analysis, when a systematic determination based on course data is used, systematic misclassification - which further disadvantaged marginalized subgroups - can be substantially reduced. One potential solution to misclassification is a hybrid system that combines the two identification methods, which DDOE began employing in the 2020-2021 academic year. In the first stage of concentrator identification, the state uses a centralized data system to classify students as concentrators based on their course records. Then, districts can supplement the data system's classification by listing a student as a concentrator if they were not previously designated. This system is equitable for two reasons:

1. The main concern for inequity is students being missed as a concentrator. The course records approach resolves issues of districts systematically missing earned concentrator status among student subgroups.
2. Because districts have more information than what is contained in course records, such as whether a student has prior work experience or credits from out of state, it is also important to allow districts to supplement the course based records with their own recommendations

The Delaware education system can continue to assess and promote equity in CTE by providing coaching to districts on how to identify concentrators, particularly for students who are systematically missed. We also encourage policymakers to talk with practitioners to identify challenges and success points in creating more equitable access to concentrator status and in identifying students as concentrators. In these conversations, practitioners can discuss potential causes of inequitable participation and misclassifications and address these issues when implementing the hybrid approach. Further, practitioners will offer valuable insights on how the hybrid approach functions, what works well, and what needs to be modified in implementation in order to ensure all Delaware students benefit from CTE.

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The Partnership for Public Education (PPE) is inspired by a vision of excellence and equity in public education for Delaware’s children and families. Our work is grounded in the belief that research, practice, family, and community are all needed in the systematic improvement of educational opportunities. This goal is most effectively achieved through collaboration and cooperation.

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Together, we can strengthen public education through collaboration and partnership.