Models for Earning Academic Requirements for High School Graduation Through Career and Technical Education (CTE) Programs

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Executive Summary

This study examines challenges faced by Maine Career and Technical Education (CTE) students in earning core academic graduation credits and some of the strategies currently in use for overcoming those challenges. Participants in the study, which used surveys and interviews, include CTE directors, core academic content teachers, school counselors, and school administrators.

Maine high school students who participate in CTE programs must juggle the schedules of their time-intensive program and the academic courses required for graduation by their sending high school. The demands of the CTE program schedule can also mean fewer options available to the student from within the full array of academic courses, levels, and electives that are offered at their sending high school. Furthermore, students who fall behind in core credits in 9th or 10th grade can face significant hurdles in catching up on their graduation requirements in time while also participating in a CTE program. Scheduling challenges are further intensified when a student's CTE is not co-located on their sending high school's campus, thus adding travel time to and from their CTE program.

CTE administrators indicated that at least some of their students had major struggles completing core math and English course requirements as a result of these challenges. In most CTEs, the proportion ranged from less than 5% to about a third of the students; two directors estimated as many as 80% of their students find it to be a major challenge.

To serve these struggling students, some sending high schools are offering academic graduation credits for work students do in their CTE programs. Based on a survey of CTE administrators, about 60% said their sending high schools award academic credit for at least some coursework done at the CTE. In most cases credit granting is done on a case-by-case basis for specific students in need, rather than as a systematic approach where credit is granted to all students in a given program pathway upon successful completion of their work.

This practice was further explored in interviews with sending school practitioners; Part II of our findings details those perspectives. A key takeaway from those conversations is that when a high school devises their own model, additional staff time is needed to ensure standards are met and students succeed. The English and math teachers in our study described these multiple tasks:

- liaising between the sending school and the CTE;
- identifying salient academic content within CTE programs as they evolve in response to industry standards;
- collaborating with the CTE instructors to include relevant assignments to meet academic standards without compromising program needs;
- supporting individual students to fulfill requirements and track their progress; and
- building interest and trust in the model.

Core subject area teachers' time likely can decrease in future years once systems become routine. If a high school simply imports an available articulation model developed by early-adopter sending high schools and CTEs, the additional staff time is reduced, but still necessary. Another

key takeaway was the importance of active and vocal support from the leadership of the sending school district recognizing the value to students of learning academic content within the context of the CTE programs.

CTE directors also identified three other potential strategies for their students to meet graduation requirements, other than gleaning credit from CTE program work:

1. core academic courses being provided at CTE sites,
2. access to early college classes for academic credit, and
3. implementation of a technical high school model.

The first is offering core academic courses on site at the CTEs, which mitigates travel challenges and allows the CTE to tailor the content to the interests of their students. About 20% of CTEs reported offering math or English courses at their site.

Another route is for CTE students to access early college courses that are made available to Maine high school students through our public and private higher education institutions. A large majority of CTE directors (90%) indicated that their students did have access to early college course options, either through the CTE or through the sending high school. However, several also questioned whether this was a meaningful support as their sending high schools only awarded elective credit for early college courses, and not credit toward core graduation requirements. Some of the early college courses currently targeted to CTE students are technical in nature and not academic, and thus would not be suitable for core requirements; the extent to which CTE students also have ready access to core academics is unclear. This is an area for potential further study.

Lastly, some CTE administrators expressed interest in the technical high school model, which does not yet exist in Maine but has been in use in other states. In these schools, CTE programs are integrated into graduation expectations at diploma-granting secondary schools for a more streamlined experience.

The report concludes with perspectives from practitioners that highlight the value and trade-offs to students and the benefits for the sending high schools when they engage in deeper collaboration with CTEs. Finally, a report appendix summarizes the models in use at four sending high schools for granting academic credit for CTE program content.

Models for Earning Academic Requirements for High School Graduation Through Career and Technical Education (CTE) Programs

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Introduction

The purpose of this study was to provide the Education and Cultural Affairs Committee of the Maine State Legislature with information about the challenges to Maine Career and Technical Education (CTE) students in meeting academic graduation requirements and to describe current strategies for overcoming these challenges. The study focuses on the perceptions of adults who would have the most direct experience with these questions: CTE directors, high school counselors, and high school and district administrators. The goals for this exploratory study were to:

1. Describe the size and scope of the challenge of meeting academic graduation requirements, in the eyes of CTE directors and sending schools.
2. Describe current efforts to grant academic credit at the sending high school for content learned in CTE programs.

Our findings are accordingly organized into two parts. Section I describes the scope and depth of the issue. Section II provides information on pathways currently in use to help CTE students earn academic credit through their CTE coursework, challenges to implementing those pathways, and strategies for mitigating these challenges. In addition, we have provided an appendix with additional details about the approaches and experiences in four districts.

Background

Maine's system of Career and Technical Education (CTE) delivers vocational programs at 29 sites across the state, plus several satellite locations. Nineteen of the sites, denoted Centers, are operated by existing pK-12 school districts (more formally called school administrative units or SAUs). Eight CTEs are stand-alone entities known as Regions that operate independently of the school districts where their students reside. An additional two CTE sites are operated at Maine's juvenile corrections facilities, with eligibility restricted to their residents. While these

categories of sites have different organizational governance structures, they all have at least three key elements in common:

- Funding for CTE programs is provided directly from the state at a level determined by a detailed CTE cost model.
- Each CTE serves a geographic area of the state encompassing multiple different school districts.
- Maine's CTEs are not stand-alone secondary schools with the authority to grant a high school diploma; the students participating in their programs must follow the graduation requirements established by the high school where they are primarily enrolled (denoted in this report as the student's *sending school*).

This last characteristic is an important point of context. Maine statute (20-A MRSA §4722) has established a minimum number of years of high school instruction in five specific content areas: English (4 years); social studies and history (2 years); mathematics (2 years); science (2 years); and fine arts (1 year). A recent (2019) change in statute now also allows for "the equivalent in standards achievement" as an alternative to counting a strict number of years of study. Each Maine school district establishes its own requirements for earning a high school diploma, using the state statute as only a minimum guideline. Districts' graduation requirements often exceed the state minimums in two possible ways: the vast majority require more years in some subjects, particularly in mathematics, and they may require completion of additional subjects represented in the Maine Learning Results standards such as physical education, health, and/or world language. This local flexibility results in variation in diploma requirements from district to district.

The statutory allowance of an "equivalent in standards achievement" rather than mandating a fixed number of years of study is still relatively new. This provision is an important and relevant policy for the current study, as it creates potential flexibility for any student to earn graduation credits for work done outside their high school courses. This could be particularly beneficial to students in CTE programs. It is unclear whether or how school districts may have formally responded to this change in the law by amending their graduation policies or practices; this is a topic for potential future study.

The same section of state law (20-A MRSA §4722) also provides important relevant guidance in subsection 3. Satisfactory completion, which states "[...] Career and technical

students may satisfy the requirements of subsection 2 through separate or integrated study within the career and technical school curriculum, including through courses provided pursuant to section 8402 or 8451-A, on the approval of the commissioner and the local school board." The cross-reference delineates that CTE programs of study can count toward state minimum graduation requirements, and that a CTE may offer core academic courses to meet the sending school's requirements.

CTE Program Structure

CTE programs are intensive, structured courses of hands-on study aligned to Department of Labor career clusters. They rely on established industry standards and expectations for each field, and most can lead to a recognized certificate or credential for qualifying students. Most typically, CTE students spend about half of their learning time in CTE studies and the other half participating in other academic courses at their sending high school over the course of two years. Thus, CTE students lead divided lives in that they are fully a part of two distinct learning communities.

Students may enroll in exploratory CTE courses as early as middle school in some districts. Other CTEs provide access to exploratory or even full-blown CTE programs to students in 9th and 10th grades. Most typically, students enroll in one- or two-year CTE programs in 11th and 12th grade.

CTE program schedules vary with some using partial (split) days in each environment, some alternating days between the sending school and the CTE, and some using a combination of the two. The amount of time spent in the CTE program can also vary for different types of programs. In some cases, a CTE program is located on the same campus as a sending high school and their students have easy access. But for most Maine high schools the nearest CTE is not onsite and the sending school must transport participating students to and from the CTE location. Students often spend between 20 to 45 (or more) minutes in transit.

In this report, we refer to both CTE centers and regions as "CTEs." Classes taken by CTE students at the CTE we refer to as "courses." Full programs of CTE study provided over one or two years in a particular area, such as Auto Mechanics, we refer to as "CTE programs." Diploma-granting high schools that send students to a CTE for part of their day or week are called "sending high schools." We refer to the school administrative units (SAUs) that operate

sending high schools using the vernacular of "school districts" rather than their more formal (and technically correct) label of SAU. This is because CTE Regions are also a type of SAU, a source of potential confusion.

Approaches for Facilitating Academic Credit

There are four broad approaches to helping CTE students meet their high school's graduation requirements. Only the first category was a major focus of this study; however, we have some feedback on the use of other strategies from our survey of CTE administrators:

1. **Sending high school grants credit for CTE course work:** CTE students can earn core academic credit for competencies gained through technical courses at the CTE. There are different models for how this can be implemented, which are described later in this report. Over half of the CTE administrators who responded to our survey (about 60%) reported that their students' sending high schools grant some academic credit for work embedded in the CTE courses, for at least some students (but not necessarily all students on a systematic basis).
2. **Sending high school grants credit for core academic classes taught at the CTE:** As mentioned above, state statute specifies that CTEs can offer core academic classes (e.g. English and math) on site that are to be accepted by the sending high schools. This approach was not included in the scope of this study, although it appears from our survey responses that about 20% of CTEs are using it. This is a potential area to be considered for a future follow-up study.
3. **Early college coursework:** Early college classes that carry core academic credit are available to eligible Maine high school students, including CTE students, either at their sending high school, within the CTE, or on-site at institutes of higher learning. This approach was not directly included in our scope, but in the course of interviews we learned that some high schools give only elective credits for early college coursework. While early college is increasingly available to all Maine students, it does not seem to be leveraged specifically for the purpose of helping CTE students meet core graduation requirements.
4. **Technical high school:** The technical high school offers the full range of academic subjects required for graduation in addition to CTE programs. Students may attend 9th and 10th grades at the traditional high school based on residence, or enroll at the technical high school beginning in 9th grade. Upon graduation, students are prepared to enter the workforce or trade schools in a particular trade or career area, or to pursue post-secondary education, as with a traditional diploma. Maine does not currently have technical high schools; however, this model has received attention among our interview participants.

Only one survey respondent reported that their CTE students did not have access to any of the above options for making it easier to earn the academic credits they needed to graduate.

Methods and Definitions

We invited administrators of the 27 current CTEs to complete a brief online survey designed to elicit their perceptions of the barriers their students face in completing their academic requirements for graduating from high school. We received a total of 22 complete responses, with each county represented. This is a robust participation which underscores the importance of this topic to the CTE community.

In addition to the CTE administrator survey, we also interviewed two CTE content liaison teachers (of English and mathematics), three administrators (including a director of curriculum and instruction), and four school counselors representing sending high schools in Aroostook, Cumberland, and Somerset Counties. In Cumberland County we included one rural and one suburban school district. The primary goal of these interviews was to understand CTE students' experiences from the sending school's perspective. These interviews provided insight into challenges the sending high schools have encountered in their efforts to grant credit for work completed outside the school in CTE programs, as well as their reflections on the importance of evolving their practices to meet students' needs. We created individual profiles of each school's practices based on their participants; these are included in an appendix to the report. The combined interviews were analyzed for cross-case similarities and differences, and our general conclusions are the basis for the main report findings.

Note that this study focused solely on the strategies for awarding credit in math and English for content students learn in CTE programs. High schools may also choose to give credit for other subjects; we encountered cases of credit reported in art, biology, social studies, anatomy, and financial literacy.

Findings Part I: Barriers to Meeting Graduation Requirements

General

It is important to begin with the reality that the students who face the most challenges in balancing their requirements never make it to the CTE. They do not pursue CTE courses or programs if the barriers are too high. Therefore, this investigation of the barriers that remain for the students who *do* enroll in a CTE is only part of the whole story. Our interviews with sending school personnel did provide some broader perspectives on how these same barriers also impact recruitment and enrollment in CTEs, but that is not our main focus in this report. This issue will

be probed more extensively in a companion study currently in process about equitable student access to CTE programs.

Completing academic coursework for graduation credit is a major challenge for at least some students at each CTE, though not a majority. Major challenges were defined as failing to graduate, needing extra time or summer courses in order to graduate, dropping out of the CTE program, or just barely passing classes to graduate on time. Only two out of 27 CTEs in Maine said that more than 40% of their students face challenges of this magnitude. In comments, other directors reaffirmed that the prospective students for whom this is a major challenge are typically filtered out of the CTE pipeline before enrollment.

School counselors interviewed likewise shared that some of the main barriers to CTE students earning academic credit through CTE coursework are the same as the ones that may prevent students from enrolling in CTEs in the first place. These include scheduling conflicts with Advanced Placement, honors, or special education classes; time spent in transportation, which can reduce the number of open blocks a student has in which to fit all their academic requirements and the social opportunities available to students; lack of CTE courses or programs of interest to the student; or placement on a CTE waiting list.

Scheduling

According to survey respondents, for those students who do experience major challenges to completing math and English coursework needed for graduation while pursuing CTE programming, **scheduling** was one of the greatest barriers while "logistics and transportation" was almost never named as a major challenge. About 85% of respondents cited scheduling as a barrier either sometimes, often, or almost always. Scheduling issues appeared to be more often a problem with math courses than English courses. Scheduling issues were defined as sending high school schedules for preferred academic courses conflicting with CTE schedules.

School counselors agree with CTE directors that **scheduling** is a barrier to most of the CTE students who struggle to earn academic graduation credits. It also appears to be a barrier to students deciding to join CTE programs in the first place. Students who would prefer to enroll in Advanced Placement or Honors courses, or music offerings, often have to choose between those courses and CTE programming given the intensive nature of the CTE programs, with alternating full days or five half days being the norm, which leaves little room for flexibility. It is the same

in the case of special education classes. In smaller schools with only one or two sections of each grade level course, it can be impossible for students to choose those courses and enroll in CTE programs. Additionally, students who have not passed 9th and/or 10th grade math or English often need credit recovery options in order to graduate in four years while also pursuing CTE programs. English is more often a challenge due to a greater number of credits required for graduation – because all schools require four years of English, failing to pass one (or more) course means needing to double up in a subsequent year. CTE program scheduling may not leave time in the day for those extra classes or may conflict with when the classes are offered. If a school does not offer an alternative pathway for credit recovery, students who become disengaged in their classes — and thus may gravitate toward CTE programs they see as more relevant–may find them out of reach. When students can earn English or math credits through their CTE program, the pressure is reduced, but not eliminated because credits earned in CTE programs appear to be limited to a total of 1 per subject over two years in the schools we studied.

Travel Time

When CTE directors' thoughts are put in the context of discussions with high school guidance counselors, it becomes clear that while transportation itself is rarely an issue, transportation *time* is often challenging for students whose CTE is at another location from their sending high school, which contributes to scheduling barriers.

Where school counselors talked about transportation being a challenge, it was similarly about the *time* the transportation takes away from the student's day. One school counselor noted that their students eat lunch on the 20-minute bus ride to the CTE each day. This prevents them from missing a class period, but it does decrease the amount of time they have to connect socially with their peers at the sending high school, which is problematic for some students and ultimately leads some not to enroll in CTEs. CTE students at other schools miss a study hall in order to commute to their CTE, which means they have less time to complete homework assignments and connect with high school teachers to get support.

Relevancy, Rigor, & Load

CTE directors also cited a lack of **relevancy** of high school coursework in math and English as a significant barrier to their students, with 19 out of 22 respondents describing it as sometimes, often, or almost always a problem. Relevancy appears to be more problematic in

math courses than English courses. Most CTE directors perceive that their CTE students sometimes to very often find the **academic rigor** of the required high school math courses to be an underlying cause of challenges in earning graduation credits; this is also true for English courses and their rigor is perceived to be even more often a barrier than in math courses.

In terms of **total academic course load** alongside CTE programming, there was no agreement across CTE directors about this being a significant barrier for their CTE students in earning math or English credits for graduation. 16 out of 21 perceive it to be not usually or only sometimes a problem in terms of math and 14 out of 21 for English. However, 5 respondents said it was often or almost always a barrier for math and 7 said the same for English. This leads to the consideration of the variety of high schools and approaches to meeting standards across the state.

CTE directors do perceive a **lack of options for math credit recovery** to be a barrier to their students earning graduation credit in math. 17 out of 22 perceive it to be sometimes or often a problem and 2 perceive it to be almost always a problem. Only 2 perceive it not to be a problem at all.

In the following section we explore emerging pathways to granting academic credit in English and math for coursework done by students enrolled in CTEs. The section begins with background on how high schools give credit for CTE coursework and then describes the specific pathways used by Maine schools identified within this study and their challenges and facilitators.

Findings Part II: Models for Academic Credit

To provide some background, successful completion of a 1-year CTE program typically earns a student three (3) elective credits, and 2-year programs earn six (6) elective credits. Graduation credits in math, English, science, and art are sometimes "embedded" or "integrated" into CTE program courses, meaning that CTE students may be able to access specific credits required for graduation simply by completing the course and perhaps creating a portfolio of their work for review by a sending school teacher. When specific graduation credits are granted, they decrease the number of elective credits the student earns. This model is in use at Bonny Eagle High School (see Appendix).

However, in some schools this is an unofficial accounting, according to the school counselors we spoke with. The student's transcript still reflects three elective credits, however the school counselor notes internally to the school that the student has also earned the required graduation credit. A typical example is a sending high school that permits a student to earn 0.5 math credits and 2.5 elective credits in each of the two years of CTE Automotive Technician program, yet their transcript will still reflect 3 elective credits each year.

A final detail of interest is that, in general, sending schools who give graduation credits in English or math for CTE coursework do so only on an as-needed basis, either at the specific request of a student or in the case of a student not being able to graduate without the academic credit gleaned from the CTE coursework. Therefore, not all students who could access credit in this way do. Bonny Eagle is one notable exception.

Pathways to Academic Credit

There are three basic pathways within sending schools for CTE students to be able to earn math or English credits for graduation through their CTE.

1. **Integrated credit.** The student is eligible for credit simply by passing the course.
2. **Embedded credit.** The student is eligible for credit once required assignments are completed and documented. These may be a part of the coursework for all CTE program students, extended assignments, or even new assignments given by sending high school liaison teachers.
3. **Newly created credit-bearing options:**
    a. The student applies for credit through submission of paperwork to the sending school's administration. A crosswalk is then needed by department heads or teaching staff who then decide whether or not the standards have been met and academic graduation credit has been earned. This process may lead to integrated or embedded credit programs in the future.
    b. A sending school CTE liaison teacher collaborates with the student to identify assignments already existing within the CTE program that show the student has met the standards and should earn credit. The teacher may give the student additional work to do and document in order to receive academic credit. The student is eligible for credit once the assignments are completed and documented.

Of note is that using the strategy of integrating or embedding credit does not guarantee a student will earn core academic credit for their CTE coursework. English and math specific credits are often reserved for the special circumstance of a student needing them to graduate within four years.

Barriers to Implementation

Specific barriers to granting academic credit in English and math identified by the school counselors we spoke with fell into three broad categories:

- Lack of awareness on the part of the student of the potential for academic credit to be earned,
- The sending school and the CTE have no agreement that provides students with the option to earn credit through CTE coursework, or
- Academic staff do not see the value to students, do not feel the coursework is rigorous enough, or feel threatened by CTEs beginning to provide courses that give students graduation credits at their school.

The teachers and administrators we spoke with identified some additional barriers. Most importantly, sending schools who are not adopting another school's model wholesale need **staff (liaison teachers) with content expertise and dedicated time** to develop and implement their own system. Specifically, liaison teachers need to understand the standards very well in order to see where they could be met through alternative pathways. They also need dedicated time to do the crosswalks between CTE courses and standards, to build relationships with students and CTE instructors, to communicate with high school teaching staff to build understanding of the benefits to students and the school, and to continuously update their own understanding of how the specific high school understands what meeting the standards entails. These discussions must be collaborative in nature and take place on an ongoing basis. Liaison teachers also need time in their schedule to visit the CTE programs to meet with instructors and examine course curriculum and assignments. Specifically for math, the traditional high school math curriculum is a linear progression, while CTE programs integrate concepts when they are appropriate to the program, not according to traditional high school math trajectories. Lifting out math credit from one CTE course and matching it entirely to one traditional high school course such as Algebra II, for example, is not feasible. Creative strategies need to be employed which takes time and expertise.

When liaison teachers also teach 50% of the time, as for the teachers we interviewed, they have limited access to CTE students who are only present on alternate or partial days. Students who attend CTE courses do not always return to their sending high school or attend high school classes regularly. Liaison teachers need to see CTE students to make them aware of the potential to earn credit or to meet with them to support their academic work. They also have less time to meet with CTE instructors to support their work.

CTE instructors willing to support embedded or integrated academic credit may need support from a liaison teacher to see where small changes or additions could make a large impact. However, even small changes may take up valuable class time that aims to be focused on industry specific certifications. Again, it takes time for the liaison teacher to build trust and relationships with CTE instructors, who may change year to year. Lastly, working with sending schools to create standard approaches to credit granting within their programs is restrictive to CTE instructors who need to change their curriculum year to year in response to changing industry standards. This is a disincentive that needs to be continually navigated year to year by a liaison to the sending high school(s).

Teachers in schools have encountered barriers created by current **guidance department systems based on seat time and space use**. Students earning credit through activity off campus without connection to teachers in the school requires thinking in new ways and also creating new systems.

Schools that have students accessing CTE foundation or discovery programs in 9th and 10th grade may find that students have difficulty gaining all four English credits without embedded or integrated credits and additional English courses at the CTE. However, there is also concern for students who re-enter the regular high school English program in 11th grade if they do not choose to attend the CTE programs in 11th and 12th grades. CTE English classes are often different enough from high school classes that students are not prepared to succeed back at their high schools. For this reason, one school we spoke with is no longer offering English credit in 9th and 10th grades for CTE programs. Instead, they have rearranged the CTE students' schedules to give more time at the sending high school while still providing access to foundational and exploratory programming at the CTE in those first two years.

Finally, **availability to students of CTE programs of interest and seats available within each CTE program** are barriers as well. Not all high school students have access to CTE programs of interest. For example, the CTE near one high school may not have the early childhood education program a student wants to enroll in. Also, CTE programs do not have unlimited seats, leading popular programs to choose among student applicants. In this case, the students who may most need to learn in alternative pathways are blocked from CTE programs because of poor grades in 9th or 10th grade, whether they fail courses, they no longer have room

in their schedule due to a lack of credit recovery options, or simply because the CTE itself does not admit them, instead choosing a more academically successful student. This latter issue can impact even highly capable and gifted students who take challenging courses in 9th or 10th grade yet earn average or below average grades due to their need to learn in more interdisciplinary or hands-on ways.

Strategies to Overcome Barriers

Not all barriers are within the sphere of influence of sending high schools or CTEs. Some challenges are more systemic in nature. Here we share strategies sending schools are using to overcome barriers to their students earning English and math graduation credits through their CTE coursework.

Growing student awareness

School counselors indicated that being proactive and doing regular "credit checks" with all students surfaces situations where a student may be in danger of not having enough credits to graduate while also participating in CTE. When this happens, a student can be proactively offered the possibility to earn credit within the CTE program as described above.

Another way to counter lack of awareness is for sending school liaison teachers and even school or district leadership to go into the CTE to interact with students and let them know that this option is available. Some schools list the credit options right in their program of studies and some CTE programs add the information regarding credit to their course descriptions and on their websites. One school said their superintendent presented the option of earning academic credit to all CTE students while they were at the CTE, normalizing the process and encouraging students to take this path.

Embedding or integrating credit into CTE courses

There were two main strategies to overcome the barriers to embedding and integrating credit into CTE courses. The first is for a district to **adopt** wholesale the standards crosswalk and credit-earning agreement between CTE coursework and the coursework available at the sending high school. This is by far the easiest method, requiring no additional work by students, and it requires no additional resources from a liaison teacher. No assignments are collected, checked, and added to a portfolio. The sending school trusts that the school that created the crosswalk did so in an appropriate way and simply puts it into place for when it is needed.

The second is for the district to **create** their own crosswalk between select or all of their CTE's programs and the standards in art, science, math, health, English, etc., which can lead to the addition of assignments to the typical CTE course requirements. This requires significant staff time and experience in the classroom. Liaison teachers visit the CTE programs to observe the overall rigor and examine assignments. Some liaison teachers even work with the CTE instructors to incorporate or lift up the academic work already being done within the courses. In addition, if the newly created crosswalk by a sending school requires a portfolio of assignments, a completed checklist, or anything of the like, it adds to staffing costs down the line. Someone must check that these assignments are being completed in a thorough and timely manner. This often means that the liaison teacher can spend a significant amount of time following up with students to collect assignments and offer support, which can include direct academic support. This crosswalk can be created in advance of offering this pathway to students, but that does not appear to be what has happened in the field.

Regardless of whether the sending school adopts an already developed crosswalk or creates their own, they will need to update the program as CTE courses evolve. This requires someone on staff to be assigned to connect with the CTE instructors as they turn over and as programs are updated.

Building support from the top down

The most important step identified by school counselors, teachers, and administrators we spoke with is for district and building leadership to champion the pathways to graduation credit within CTE programming. Having and sharing a vision is essential. Communication between leadership, department heads, teaching staff, and guidance—ideally before initiating the new pathways to credit and making them available and ongoing as the program is being developed—is crucial to building and maintaining support. Show and tell sorts of meetings where teaching staff can look at CTE student work to consider how it might meet standards can be helpful for changing assumptions of what "counts." Leadership can guide staff toward student-centered approaches that move beyond "we have always done it this way" thinking. Guidance staff needs to know to prioritize timely collaboration with liaison teachers or others who are developing the program to make sure their systems permit students to earn credit in this way.

Staff who do not support students earning credit for math or English at the CTE can steer students away from this option in schools that grant the credit automatically. One school

principal has discussed with his staff that every educator should be considering how their students can meet standards in a variety of ways and that the students who earn credit through CTE coursework are simply taking advantage, in a very obvious way, of what should be available within every classroom. This principal understands earning credit through CTE coursework to be the beginning of a transition in his school and others to students earning credit for other kinds of out-of-classroom experiences such as extended learning opportunities. He indicated that his message to staff has been that if students are choosing other ways to learn English, then English teachers need to spend time making their classes more relevant to their students. A specific approach their school took was for English teachers to stop offering only yearlong courses identified simply by grade band and instead offer semester-long courses on specialized topics. When they began doing this, CTE students who were earning academic credit through their CTE courses started adding high school English courses back into their schedule, earning them more English credits than they needed to graduate because of their interest in the courses the teachers were offering.

Finally, it takes significant time for a school to create their own crosswalk, and teachers' time to do this work needs to be allocated thoughtfully by district or building leadership. Building understanding among colleagues for these teachers' work is another aspect of the support needed from district and building leadership.

Offering multiple pathways for credit recovery

High schools can be creative in offering opportunities for credit recovery for students who are more likely to succeed in the learning environment at a CTE but who have lost too many credits to make it possible. Alternative education programs that grant credits on a proficiency basis as opposed to a seat-time basis are often very successful in supporting students who are not successful in a typical classroom. Online courses are another way high schools are helping students earn lost credits. These courses are self-paced, meaning students can move through them quickly and cover lost ground in less time. However, online courses often require a student to be self-motivated and use organizational skills that are not always fully developed in the students who most need to avail themselves of this opportunity. Schools can provide more individualized support for these students as possible and needed. Summer school is another way students can recover credits in order to be able to attend CTE programming during the year. Last, some schools provide intervention teachers who will work one-to-one or in small groups with

students to offer a slower paced version of math or English classes being repeated to ensure success. Not every high school offers any of these four options, however, making access to credit recovery and therefore CTE programming, and math and English credits available within it, inequitably distributed throughout the state.

Conclusions & Policy Implications

Benefits and Trade-offs to Students

Earning credits from CTE coursework already being taken is efficient for students and can help them graduate in four years. It can also be a credit recovery pathway when credit deficiencies are not large, which may keep some students engaged in school instead of dropping out. For students who are able to take CTE courses because of the academic credit they can earn, building closer relationships with professional adults, practicing accountability, exploring interests, and getting a start on their career are all benefits they can enjoy.

Students may prefer learning at the CTE because instruction models are different from a traditional high school classroom. Students report to the school staff we spoke with that they are "treated more like adults" and are taught in ways that are more engaging and participatory. School staff report that CTE students can be less excited to return to their sending high school and traditional learning models. This may not be the case for all sending schools, especially those that are smaller and offer a more tight-knit social community. We also heard from some schools that CTE students feel stretched between two communities and feel they are missing out on high school happenings when they are at the CTE. This appears to be less often the case for students whose CTE is attached to their high school. We heard from more than one school that having a four-year technical high school would mitigate both of these problems for students.

Value to the Sending High School

Offering CTE students the opportunity to earn graduation credits in their CTE programs can increase the graduation rate of the sending high school, which may lead to a more positive perception of the district by the community. The schools we spoke with noted that the value to the school and greater communities of offering more pathways for student success is not quantifiable, but is felt, nonetheless. It reflects the values of the community.

When more students in a large high school are accessing academic credits at the CTE, it may reduce the number of students enrolled in English and math classes at the high school. In one district this looks like junior English classes of eight to 10 instead of 20. If seen in a positive light this can be a bonus for teachers, reducing class sizes and allowing for more individualized instruction in smaller groups. It can also stimulate teachers to create new, more engaging courses to entice students to take their English credits at the high school. Seen from a different perspective, this shift of students from sending school teachers to CTE instruction also has attendant staffing implications arising from the new efficiency. In a time of teacher shortage, this may present an opportunity rather than a threat; each school-CTE pairing may be different.

One principal we spoke with shared that his high school was inspired by what their CTE had achieved in terms of strong and growing enrollment and low and declining discipline issues. He said, "The high school needs to learn what they are doing right and mirror it." He also said that his students felt like they were "part of a family" at the CTE, and that even students who had a high number of absences at the high school didn't miss classes at the CTE — they were happy to go there. One reason for this that the principal cited was the way students were put into cohorts: "15 students learning together for 4 hours per day versus 20 students moving around in separate 80-minute blocks." Having the CTE adjacent to the high school has "forced them to evolve" given that students do have ready access to this other way of learning. The school is taking it upon themselves to change, with the leadership creating and sharing the vision and supporting the implementation into the details and through the "messy process." They hoped that their comprehensive approach would help alleviate a fear of change that educators might feel.

Maine Department of Education Revised ELA Standards

The Maine Department of Education recently revised the English Language Arts standards to incorporate multiple types of text. Each district is free to adopt these standards in their own way, and one school we spoke to has used the standards revision to bolster its efforts to allow CTE students to earn credit in technical classes. However, because the standards are not a mandated curriculum, some districts may not see the need to update their own standards to allow for multiple types of text to be used. If districts do not leverage this opportunity to support new pathways for students seeking English credit through CTE coursework, there will be no tangible benefits for their students. Some districts may find it difficult to envision what constitutes

adequate achievement in English. Ongoing communication about the rationale for the new standards, including examples of successful districts, may help others to develop a better understanding of the benefits to students.

Recommendations from Sending School Staff and Administrators

We asked our interviewees to share what state policymakers could do to support pathways for earning academic credit in CTE programs. Below is a distillation of their suggestions.

Require, or at a minimum incentivize, districts to provide pathways for students to earn core academic credit through CTE programs, and support schools with knowledge and financial resources to make it possible.

In terms of provision of financial support and incentives, there were multiple suggestions.

1. **Incentivize pooling of resources across the sending schools.** This could look like state-funded positions that function regionally, positions shared among sending schools to one CTE, or a position at the CTE itself to liaise with sending schools and students. To consider is the level of autonomy each district will want to retain.
2. **Support given directly to CTEs to hire a full-time teacher to liaise with all sending schools**. That person creates the "checklists" for each course, coordinates with guidance from sending schools, reviews portfolios, etc. This would require sending schools to trust the CTE teacher's interpretation of the standards. Some districts may not want to relinquish control.
3. **Provide opportunities for schools to learn how to resource from within.** Share successful models being used currently. One liaison teacher suggested we share this example of how a sending school is supporting a liaison teacher. If enough students are earning credit through CTE courses, enrollment in other English or math classes should shrink, as it has at Bonny Eagle. One teacher can teach regular high school English classes three blocks per day (of the five) and spend one block reviewing CTE student portfolios and connecting with students getting core credit through CTE coursework. These blocks can rotate between mornings and afternoons throughout the year to ensure the liaison teacher connects with different groups of students given that juniors and seniors often attend CTE courses at different times of day. This teacher can make a handful of visits to the CTE to build relationships. The fourth block that they would have taught may not be needed if English class enrollment is low enough due to enrollment through the CTE, or their students could be spread among other classes. This requires a willing teacher and a baseline checklist of assignments in place for each program at the CTE.

In summary, Maine CTEs are at an important moment. They are seeing a positive shift in opinions about the value of their programs to both students and the state workforce. With a

recent influx of resources, they are poised to serve more students. Continuing to build systems that foster interdisciplinary learning, and that value the CTE ethic of having students demonstrate what they know and can do, is both forward-thinking and efficient.

Appendix: Sending School Profiles

Schools with adjacent CTE centers: Skowhegan Area High School (SAHS) and SCTC

We spoke with one school (Skowhegan Area High School) that has an adjacent CTE, Somerset Career and Technical Center (SCTC), which provides unique opportunities and challenges. Students have ready access to the resources of the CTE, making for a potentially competitive environment if the high school chose to see it that way. But the school's principal shared that by working collaboratively and proactively with the CTE leadership they could create a more mutually supportive environment that focuses on student success and wellbeing. Having a CTE at the high school also means that high school students can more seamlessly move back and forth between programs. Notably, not all students at this CTE come from the adjacent high school, and those commuting students may have fewer opportunities to take full advantage of all the CTE has to offer due to the travel time.

Students in this sending school choose to attend the CTE programs for two main reasons: relationships and relevance. The principal described the "family" students form at the CTE and their strong desire to complete as much work as possible there. He also described students enjoying the instructional methods. The coursework is tied to their interests and feels relevant to their lives in that it connects with potential future careers.

Students choose to earn English academic credit at the CTE for a few reasons: smaller classes with more individualized learning, more relevant courses and assignments, credit recovery options (they can take English at the CTE and at the high school at the same time), and scheduling flexibility (their CTE schedule may not allow them to take regular high school English).

SCTC has an English teacher on staff who teaches Technical Writing, which Skowhegan High School has approved for English credit. CTE students can take this course for English credit in addition to their CTE programming, earning one full credit for the course, the same amount of credit given for the traditional English courses at the high school. This teacher also teaches SCTC students writing within certain programs. Electricity is the only program that currently has embedded English credits, which total ½ credit for each year. Electricity students can earn ½ credit of English plus an additional one credit of English by also taking the technical writing course. Next year, Skowhegan high school students not enrolled in CTE programs will be able to take Technical Writing at SCTC for full academic credit on a case-by-case, as needed, basis. This is one way the school is working to support students who need alternative paths to fulfilling their graduation credits. Skowhegan Area High School currently has 6-7 students earning English credits through their Electricity CTE program.

Having an adjacent CTE offers high school students more opportunities to enroll in dual (concurrent) enrollment early college courses as alternative pathways to math and English graduation credits. Skowhegan Area High School (SAHS) offers dual enrollment courses, and so does SCTC. Students who can't fit SAHS dual enrollment courses into their schedule are permitted to enroll in dual enrollment courses at SCTC. Both offer Intro to Literature and Intro to Composition dual enrollment courses for high school English credit. SAHS students also have access to a Technical Math course through Kennebec Valley Community College. Next year, SCTC will also offer a Technical Math dual

enrollment course taught by their math teacher, which will double the opportunities for students to fit this alternative pathway to math credit into their schedules.

Small rural high schools: Central Aroostook Junior-Senior High School

Central Aroostook Junior-Senior High School has under 170 students enrolled, which limits the elective offerings available to their students. In small schools, CTEs provide the opportunity for students to be exposed to a greater variety of elective subjects than their high school can offer. Unlike larger schools, students do not attend the CTE for smaller classes or a more family-like atmosphere. They attend to expand opportunities for exposure or to gain certification specifically. 11th and 12th grade students are strongly encouraged to take CTE programming, at their assigned CTE in Presque Isle or a bit further away in Caribou, where the CTE offers a different variety of options. Students are encouraged to go to the CTE programs even if they are not taking a two-year program for certification. In order to make this feasible for all students, and to incentivize their attendance, the school adopted a model for granting academic credit created by the Bath school district.

In addition, because students tend to enjoy staying in their home school, to incentivize student attendance in CTE programming they have scheduled it in such a way that students miss only their lunch period and the start of the last period of the day in which students connect with their teachers. This arrangement permits students to miss the least amount of their typical high school experience. If students choose to go to the further away CTE in Caribou due to their interest in a program not offered more locally, they need more options for earning academic credit because they will miss course time at their high school due to longer travel times.

In this model, students can earn 1 credit of math over two years in the carpentry program, but otherwise students do not generally access math credits. For one year of CTE programming, students can earn ½ math credit and ½ science credit through a variety of courses towards the 4 math credits and 3.5 science credits required by the school for graduation. Since there is no pathway to gain another ½ credit of math at the high school or at the CTE, students have not taken advantage of this ½ credit of math available to them unless they are in the full two-year program. However, students regularly access the ½ credit of science in their junior or senior year, which relieves them of the need to take a ½ credit lab. The model the school adopted does not offer English credit for CTE programming; they are open to developing a crosswalk but this has not yet been needed by any of their students given the other credit recovery options available such as intervention teachers, online courses, and summer school. Credits here are not granted automatically but are accessed through discussion with the guidance counselor, who readily grants them as needed.

Small schools with plenty of credit recovery options and a schedule that permits students to do both the full CTE program and the full high school program do not necessarily need extensive embedded or integrated English and math credits in their CTE programs. And they can be flexible in quickly developing a plan for individual students as needed.

Large Schools Developing Comprehensive Credit Granting Programs: Bonny Eagle

Bonny Eagle's comprehensive approach will be detailed here. We spoke to both the math and English liaison teachers as well as the assistant superintendent to gain understanding of their current model, how they developed it, and what they imagine as the future of the program. We share it here as a model of what schools can do to reduce barriers to CTE students earning credit. However even Bonny Eagle students face barriers, which will be noted below.

Bonny Eagle has 54 high school students earning English credits and 13 earning math credits this school year. The high school employs two liaison teachers, one in English and one in math, who each dedicate 50% of their time to supporting the CTE pathways for students to earn academic credit. The school is invested in offering this pathway for students who are likely to be most successful in earning credits through CTE coursework. Recruitment for the academic credit pathway used to be more direct, with the superintendent visiting the CTE to encourage students to try to earn academic credit for their CTE coursework and the English liaison teacher speaking directly with students at the CTE. However, this year, the path has become more formalized through the guidance department, giving guidance counselors the ability to determine with the student the best pathway to achieve their future goals.

This is the third year the school has offered English credit in CTE courses and the first for math. The program began with one halftime English teacher working to create individual pathways for each CTE student and in this way the program developed organically: CTE courses with students who wanted or needed to earn academic credit in English were attended to first and individual assignments were created for each student by the liaison teacher as needed to augment the CTE content. The liaison teacher worked individually with CTE instructors too, as they were willing and able to adjust their courses to make it easier for students to simultaneously earn academic credit while working toward industry certifications. She has developed a checklist of assignments for each of eight of the 16 CTE programs at their CTE. By completing and documenting in a digital portfolio the checklist assignments for their program, CTE students can earn ½ credit of English in each of their 11th and 12th grade years for a total of one English credit out of the four required for high school graduation.

The math pathway began in a more organized way, only offering the potential for students to earn ½ credit of math in four CTE programs and planning from the start to develop and use checklists for those four programs and to have students use digital portfolios for assignments proving achievement of standards. They intend to add more opportunities for credit through additional CTE programs in the years to come. However, they noted that there are fewer opportunities to glean math standards from CTE courses, even the ones with significant amounts of math simply because juniors usually take Algebra II, whose topics are not typically a part of CTE courses. The high school is considering changing the second half of Algebra II to include more of a focus on statistics and data analysis and doing so would create a clearer path to math credits in CTE programs. In the meantime, math credit earned in CTE programs is called Algebra 2B on student transcripts. In order to qualify for the math credits, a student's work must cover at least two of the four reasoning standards outlined by the Maine Department of Education. In future years, the program will aim to cover three of the four in each CTE program offering math credits.

For schools endeavoring to follow Bonny Eagle's model, it is important to note that the process for developing English or math assignment checklists for the first time, with students, can be a messy process. First, students are required to take active ownership of the process of proving their achievement. This in itself can be a barrier, even as it is meant to provide immediate access to students in need of more flexible pathways. The math liaison teacher works with individual students to consider where in their courses they are using the different types of mathematical reasoning and where they are meeting math standards. Sometimes students are required to do a bit of extra work, an extra math assignment, for example, to augment the CTE course. Students are also required to write a reflection on how each assignment they add to their portfolio is an example of mathematical reasoning and meets standards. Writing this paragraph can be a barrier for some students who are less academically inclined. The math liaison teacher helps them complete this task where appropriate, and he is considering allowing students to create a video to share their reflections. Ultimately students need to include two assignments for each of two of the four math standards.

Next year, Bonny Eagle will require CTE students to include two assignments for each of three of the four math standards. This is an example of their progressive program: they are focusing on accessibility, building a program over time while supporting students to find success immediately. At the end of this first year of "building the plane while flying it," Bonny Eagle will have math assignment checklists for four CTE programs, reducing the additional work for students to prove their learning within CTE courses. During this development process, when students are required to do the additional work of finding connections between their CTE courses and high school requirements, they earn the full 3 elective credits for their CTE program plus an additional ½ credit for math. In the future, CTE students taking advantage of embedded credits will receive 2.5 elective credits and ½ math credits, as is the case now with English credits due to work done by the liaison teacher in previous years.

Students who are in dual enrollment courses at the CTE center have a bit of an easier time earning math or English credit at Bonny Eagle. Those instructors are working more directly with students in their courses to connect CTE course content to high school academic standards.

Bonny Eagle's English and math liaison teachers are working with the Westbrook CTE to develop a crosswalk for other Maine schools to adopt. It is broader than the one they use at Bonny Eagle and meant to be connected with state standards more than individualized for one high school. It will be an open-source guide for Maine districts to integrate core academic credit into five CTE programs. The Westbrook CTE is also creating a guide for integrating science credits into CTE courses. This is funded through a grant from the state, and it should be finished in May or June. Districts can either adopt it and put it into use immediately, or they can assign a teacher to use it as a template to create their own district's portfolio requirements.

Bonny Eagle's long-term vision is to have as many CTE courses at Westbrook CTE as possible have embedded academic credit.