

**Recommendations for a Cost Model to Fund
Career and Technical Education in Maine**

Updated Report to the Maine Department of Education

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Maine Education Policy Research Institute

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Recommendations for a Cost Model to Fund Career and Technical Education in Maine

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Introduction

Purpose

This Report was prepared for the Maine Department of Education as the culmination of a long-term project to develop a cost model for Career and Technical Education funding. The intent of the work is to identify a system for funding Career and Technical Education (CTE) schools that will provide adequate funding for the type and size of programs they operate. Prior work was summarized in reports prepared by MEPRI in 2007, 2009, and 2010. The current project entailed analyzing the model that was developed in 2010 using updated data and making changes to the model to better reflect the present realities in the CTE schools. The report summarizes the analysis as well as the input received from stakeholders that was used to shape the final model recommendations.

Report Organization

After a brief summary of the study methods and data sources, the report provides a background section describing the organization, programs, and enrollments in Maine's 27 CTE schools. The next section provides a rationale for embarking on the cost model development work based on the limitations and challenges of the existing expenditure-based funding model. Following that, the body of the report is focused on describing the elements in the proposed CTE cost model. For each model component, analysis is provided to explain the model recommendation, the fit between the recommended model and current estimated costs, and a description of any updates made from the 2009 model in response to stakeholder input. The report concludes with a brief summary of the updated model recommendations, including considerations for implementation.

Methods and Data Sources

The cost components of the CTE cost model were analyzed individually. Researchers first updated the CTE cost model components with newer data using the same methods described in previous MEPRI CTE reports from 2007 and 2009 and then modified the model components

taking account of stakeholder feedback and the results of analysis. The update used enrollment, expenditure, and human resources data provided by the Maine Department of Education.

The initial source for stakeholder feedback was the CTE Funding Formula Committee, known informally as the “CTE stakeholder group.” The group was formed by the Maine Department of Education in the prior model development work, and is comprised of fourteen representatives from CTE directors, business managers, superintendents, and the State Board of Education. Representatives from the Maine Department attended the stakeholder meetings, which were organized and facilitated by MEPRI. The group convened in August and October 2016 to review cost data analysis and preliminary model development, and members also provided feedback by email and in individual conversations with researchers. In addition to the stakeholder group, input was also solicited from all CTE directors by a survey administered in September 2016. Additional input was obtained from CTE Directors and business managers in spring 2017. A presentation was provided to the Maine Administrators of Career and Technical Education (MACTE) in April 2017 based on a preliminary cost model report released in late February. This presentation revealed additional perspectives as well as concerns about data accuracy in a few selected CTEs that had not emerged in the prior work with the Stakeholder Group. The current report incorporates updates to model estimates based on corrected data provided by the CTEs and captures additional issues and questions for policy discussion in moving forward with implementation of a cost-based funding model.

As with the Essential Programs and Services (EPS) cost model for regular education, some of the cost components were initially developed based on staffing ratios using human resource and enrollment data, while other components were developed based on per-program or per-pupil amounts using financial and enrollment data. Some components were developed based on policies or practitioner input rather than empirical data. Once the CTE cost model was updated and modified, the resulting computed total CTE cost was compared to actual statewide expenditures in each component and to total operating expenditure in each of the CTE regions and centers.

Human resources data used to compare model allocations to actual staffing levels and to determine salary estimates was from fiscal year 2016. It included detailed data on teachers, administrators, and other staff. Full time employees were designated 1.0 FTE (Full-Time Equivalent). Part time employees were designated as between 0.1 and 0.9 FTE in increments of

0.1. Detailed data for each CTE employee included salary, highest degree earned, and number of years of experience as an education professional in both public and private schools. The number of years of experience of CTE teachers in their trade was not available. This was a limitation, because CTE teachers are typically given credit toward experience on the local salary scale for experience in their trade. Such data would be instrumental for creating an accurate, unique teacher salary matrix for CTE and for evaluating the fit between the regular EPS Salary Matrix and actual CTE teacher salaries.

The expenditure data used in the study from Fiscal year 2015, which was the most recent year available when the analysis was conducted. Detailed expenditure data was split into components of the CTE cost model by researchers based on account codes. Expenditure data was used in developing several of the components, as well as in comparing the CTE cost model to actual statewide expenditures in each of the components and to total operating expenditure in each of the CTE regions and centers.

Because two separate years were used for expenditure and human resources data, enrollment data from both fiscal years 2015 and 2016 were used. When necessary for the analysis, pupil ratios and per-pupil and marginal expenditures were calculated using the year of enrollment data corresponding to the year of expenditure and staffing data, respectively. Some basic information about CTE in Maine is shown in Table 1.

Table 1. Maine CTE Basic Information

| | |
|----------------|---------------------|
| 27 | Schools |
| 8,467 | Students (2016) |
| 315 | Programs (2016) |
| 333.3 | FTE Teachers (2016) |
| \$44.4 million | Expenditure (2015)* |

*General Fund operating expenditure excludes transportation, debt service, and major capital. Federal Perkins Grants totaled an additional \$1.9 M. In 2015, there were 7,921 students in 312 programs.

Background on Maine Career and Technical Education

CTE Structure & Funding

Public CTE schools in Maine are of two kinds: CTE centers and CTE regions. A CTE center is a school within a School Administrative Unit (SAU) that operates regular schools as well. It operates under the SAU superintendent and within the SAU budget. Other member SAUs also send their students to a CTE center, and may or may not pay assessments to the SAU that operates the center. In Maine statute, MRSA Title 20-A Chapter 313, a CTE center is defined as “an administrative entity [...] that provides career and technical education to secondary students. Unless otherwise specifically provided for by this chapter, a center is governed, operated and administered by a single school administrative unit. A center shall make its programs available to serve secondary students from school administrative units with which it is affiliated. A center may include within its administrative structure career and technical education satellite programs operated by school administrative units with which it is affiliated.”

A CTE region operates independently from any SAU, with its own board and its own budget. Member SAUs send their students to the CTE region and pay assessments to the region. A CTE region is defined in Maine statute (MRSA Title 20-A Chapter 313) as “a quasi-municipal corporation established by the Legislature to provide career and technical education to secondary students that is comprised of all the school administrative units within the geographical boundaries set forth for each career and technical education region in section 8451. A region is governed by a cooperative board formed and operating in accordance with this chapter.”

Maine has 8 CTE regions and 19 CTE centers. Regions and centers are both funded ultimately by local, state, and federal sources. All CTE schools receive federal funding, including Perkins grants, directly to the school. However, regions and centers receive their state and local funding via different routes. Regions receive their state and local funding by charging assessments to their member SAUs. Region member SAUs have a CTE allocation as part of the calculation of their funding. In centers, the CTE allocation is in the operating SAU’s funding calculation, not the members’.

CTE Enrollments and Participation Levels

The size of CTE schools, as measured either by student enrollments or numbers of programs offered, varies substantially. CTE centers have a broader range in size than CTE

regions. Both the largest and the smallest CTE schools in Maine are centers. The largest, Lewiston Regional Technology Center, had 862 students in 17 programs in 2016. The smallest, Van Buren Regional Technology Center, had 36 students in 4 programs. The CTEs also vary by the proportion of high school juniors and seniors in the sending high schools that choose to participate in CTE programs. Table 2 on the following page provides a summary of the enrollments, numbers of programs, and participation rates for each CTE.

Participation rates were estimated based on the reported CTE enrollment for 11th and 12th grade students in 2014-15 divided by the number of juniors and seniors attending the high schools that sent students to each CTE. For these purposes, high schools were matched to the CTE where they sent more than one student. Nine high schools split their students and sent them to more than one CTE; the enrollment at these schools was proportionally divided among the receiving CTEs based on the numbers of CTE students sent from the high school. This methodology is imprecise for representing total participation rates, as several CTEs also enroll sophomores and other younger students. However, limiting calculations to upper-level students provides more comparability across CTEs. CTEs that draw from a large number of high schools will have more students counted in their denominator as potential participants. The measure provides a sense of the wide variation in participation rates at different CTEs (ranging from 12% at PATHS, one of the larger CTEs, to 72% at Van Buren Regional Technology Center, the smallest CTE).

Table 2. Maine CTE Center and Region Enrollments, Programs, and Participation

| CTE School | 2016 Students | 2016 Program Types | 2014-15 Estimated Jr. & Sr. Participation Rate* |
|---------------------------------------|------------------|--------------------------|---|
| CTE Regions | | | |
| Maine Region Ten Technical High Sch | 270 | 13 | 20% |
| Mid-Coast School of Technology** | 638 | 17 | 29% |
| No. Penobscot Tech-Region 3 | 224 | 9 | 33% |
| Oxford Hills Tech - Region 11 | 419 | 18 | 49% |
| Region 9 School of Applied Technology | 193 | 9 | 24% |
| Region Two – Houlton** | 224 | 9 | 50% |
| United Technologies Ctr-Region 4 | 546 | 15 | 25% |
| Waldo County Tech Ctr-Region 7 | 242 | 15 | 36% |
| CTE Centers | | | |
| Bath Regional Vocational Center** | 210 | 10 | 26% |
| Biddeford Regional Ctr of Tech | 349 | 12 | 31% |
| Capital Area Technical Center | 378 | 14 | 21% |
| Caribou Regional Technology Ctr | 195 | 13 | 44% |
| Coastal Wash Cty Inst of Tech | 88 | 4 | 32% |
| Foster Regional Applied Tech Ctr | 359 | 14 | 46% |
| Hancock County Technical Center | 204 | 10 | 21% |
| Lake Region Vocational Center | 181 | 9 | 29% |
| Lewiston Regional Technology Ctr | 862 | 17 | 28% |
| Mid-Maine Technical Center | 472 | 13 | 21% |
| Portland Arts & Technology H S | 519 | 17 | 12% |
| Presque Isle Reg Career & Tech Ctr | 122 | 6 | 37% |
| Sanford Regional Technical Center | 466 | 17 | 19% |
| Somerset Career & Technical Center | 328 | 11 | 38% |
| St Croix Regional Technical Center | 163 | 10 | 36% |
| St John Valley Technology Center | 120 | 6 | 37% |
| Tri-County Technical Center | 267 | 10 | 27% |
| Van Buren Regional Technology Ctr | 36 | 4 | 72% |
| Westbrook Regional Vocational Center | 392 | 13 | 21% |
| Maine Total | 8,467 | 315 | 25% |
| Mean | 314 | 12 | |

* Participation rates of high school juniors and seniors in CTE programs, as calculated from 2014-15 CTE and sending high school enrollment data provided by MDOE staff.

** Participation rate calculated with estimates for selected sending schools with missing data

Another potentially helpful depiction for CTE context is the junior and senior participation rates in CTE programs at each Maine public high school. Appendix A provides a list of the junior and senior CTE enrollments in each high school and their resulting CTE participation rate in 2014-15. This rate varies markedly. Not surprisingly, high schools that are closer to a CTE tend to have higher participation rates. Appendix A also provides the percent of students in the school that are eligible for free and reduced-price lunch (FRPL), an indicator of student poverty level. Table 3 provides a summary of high school participation levels across the state in 2014-15.

Table 3. 2014-15 CTE Participation Rates in Maine High Schools

| % of HS Jrs. & Srs. Enrolled in CTE Programs | Number of High Schools | Average Total HS Enrollment | % of HS Students Eligible for FRPL |
|--|------------------------|-----------------------------|------------------------------------|
| 0-5% | 17 | 202 | 30.8% |
| 6-20% | 38 | 545 | 34.1% |
| 21-40% | 43 | 466 | 46.9% |
| 41+% | 20 | 466 | 57.8% |
| Total | 118 | 453 | 42.8% |

It is noteworthy that CTE participation rates were higher in schools with higher poverty (as measured by FRPL rates). The correlation between these measures was $r = .48$ ($p < .000$); this is a moderately strong relationship, as correlations range from 0 (no relationship) to 1 (direct relationship). In addition, the high schools with low CTE participation rates (0% to 5% of juniors and seniors) tended to be smaller, on average, than high schools with higher rates.

CTE Program Information

In the 2015-16 school year, there were 8,467 students enrolled in 315 CTE school programs statewide. The top 20 most popular programs by student enrollment are listed in Table 4. These 20 programs include more than two-thirds of all CTE school programs and enroll more than three-fourths of all CTE students. Similar information on all programs is listed in Appendix B.

Table 4. Top 20 Programs By Enrollment 2016

| Program | School Programs | Students |
|--|-----------------|--------------|
| Health Professions and Related Clinical Sciences | 22 | 849 |
| Automobile/Automotive Mechanics Technology/Technician | 24 | 651 |
| Culinary Arts/Chef Training | 21 | 591 |
| Carpentry/Carpenter | 23 | 443 |
| Child Care Provider/Assistant | 18 | 427 |
| Welding Technology/Welder | 16 | 391 |
| Job-Seeking/Changing Skills | 2 | 343 |
| Criminal Justice/Police Science | 10 | 274 |
| Computer Installation and Repair Technology/Technician | 14 | 269 |
| Autobody/Collision and Repair Technology/Technician | 11 | 248 |
| Cooperative Education | 4 | 243 |
| Electrician | 10 | 228 |
| Business Administration and Management, General | 4 | 189 |
| Security and Protective Services | 6 | 176 |
| Machine Tool Technology/Machinist | 9 | 174 |
| Vocational Special Needs | 6 | 163 |
| Administrative Assistant and Secretarial Science, | 4 | 157 |
| Business/Office Automation/Technology/Data Entry | 3 | 141 |
| Drafting and Design Technology/Technician, General | 7 | 122 |
| Commercial and Advertising Art | 6 | 118 |
| Top 20 Programs | 220 | 6,197 |

The remaining students were enrolled in 109 offerings of 45 different programs, with average enrollments ranging from 3 to 81 students per CTE program.

Rationale: Why a Cost Model For CTE Funding?

Funding Challenges

Currently, the funding model for CTE schools is expenditure driven. An expenditure based model assumes that the cost of providing CTE is whatever amount the school has spent in the past. The CTE allocation for each School Administrative Unit is equal to the operating expenditures of the most recent available year, adjusted for inflation. The most recent available year of actual expenditure data is always two years prior to the funding year, because funding for the next fiscal year must be calculated before the end to the current fiscal year. This results in a two-year lag in translating actual expenditures to funding amounts. In other words, when CTEs increase or decrease their expenses in response to changes in their offerings—such as when adding or discontinuing programs—it will impact their funding allocation two years later. Because a share of the allocated funding amount is provided in state subsidy, this means that CTEs wishing to increase expenditures must raise the funds locally at first. After two years, the increased spending will be picked up in the funding allocation and a portion will be subject to receiving additional state subsidy. Likewise, schools that decrease spending will see a subsequent reduction in subsidy.

The funding model proposed in this report is cost-based rather than expenditure driven. A cost-based model provides funding based on what it should cost a school to provide the services and programs covered in the model. The model amounts are computed by using the prior staffing and expenditure patterns across all CTEs to determine the funding that is typically needed for each CTE based on its program offerings and enrollments. Additional information from stakeholders provides context about the policies and practices that CTEs use in their work (e.g. minimum student ratios or maximum class sizes for certain program types).

There are several reasons to prefer a cost model to an expenditure-based model. First, a cost model may be more adequate. While care must be taken to assure that a cost-based model provides enough funding to provide the services, the same may be said of an expenditure-driven model. An expenditure driven model is tied to actual past expenditures, but a cost model gives decision makers a means to allocate resources beyond actual expenditures in areas where stakeholders and experts express a sense that current resources are not adequate.

A cost-based model may also be more equitable than an expenditure-driven model when considering differences in community wealth. First, CTEs wishing to expand, change, or

improve their program offerings in response to student interests must initially rely on local funds to increase spending due to the two-year lag in an expenditure based system. Communities with lesser property wealth have a lower ability to raise additional funds from local property taxes, which may directly result in inequitable opportunity for their students. Second, the lower CTE expenditures caused by lower local funding ability translate to a lower EPS allocation (with less state subsidy) for those CTEs two years later. Thus, in the current expenditure-based funding system, communities which have a lesser ability to raise additional local revenue may end up also having less opportunity to also gain a larger share of state subsidy resources compared to communities with a greater ability to raise additional local revenue. Under the recommended cost-driven model, lower wealth communities would not have their EPS allocation or state subsidy diminished by their lesser ability to raise local funds.

Current Barriers and Challenges

To provide additional context and input, an anonymous survey was sent to the Directors of all 27 CTE schools in early fall of 2016. In response, 24 Directors (89%) provided information about their programs and feedback on their funding challenges.

The Directors provided information about the enrollment levels in 246 program types offered at their schools. Of those programs, they reported that 23% (56 programs) were currently oversubscribed and typically unable to include all of the students who were interested in enrolling. Twice that number were operating at or near full capacity (111 or 45% of programs). Less than a third of offerings (79 or 32%) were typically below full capacity. The programs most likely to have waitlists were in the areas of health services (74% of programs oversubscribed), welding (41% oversubscribed), graphic arts (38% oversubscribed), and automotive technology (35% oversubscribed). Three out of the four programs each in wood harvesting and marketing/sales typically had room for additional students, and 14 of 20 building trades programs (70%) also tend to operate with empty seats. Respondents identified pre-engineering technology, cosmetology, electrical, health studies, business studies, and cooperative education programs as those they would most like to add or expand in their offerings.

When asked about the barriers to adding new programs or expanding existing program offerings to accommodate additional students, the biggest three challenges reported were: 1) lack of building space and/or funding for new space, 2) lack of up-front annual operating funding subsidy for the first two years of operation, and 3) Lack of funding for new equipment. Lack of

student demand was rated as “not a top three challenge” by 64% of respondents. Difficulty finding qualified teachers, including state licensure requirements, was reported as a moderate challenge.

In additional comments, CTE directors expanded on their challenges in these areas with these quotes:

- “We currently have no space to expand programming. Diesel Mechanics would complement CDL and Heavy Equipment Operations, yet we have no room for a program of that nature. Local businesses are literally begging us to start the program as diesel technicians are in high demand, yet we do not have the space.”
- “The facility was built in the seventies to house six programs. Since then we have added four more programs using existing space. We also rent space off campus.”
- “Our shop spaces and classrooms are small for today's standards and the infrastructure is challenged to meet the requirements of today's equipment. Our ventilation, heating and electrical is not adequate.”
- “Our building is structurally sound, however it needs to be updated in the area of mechanical systems (duct collectors system, lighting, electrical), energy efficiency, and IT infrastructure. We also are not compliant with ADA in a section of the building.”
- “We have capacity to add programs not requiring specific facility needs (e.g., a software development program).”
- “We have space that has potential to be converted into classroom/program space. We do not have the funding to do so.”
- “We currently have to eliminate a program to add a new one.”

The survey also inquired about other issues facing CTE schools, which elicited comments such as these:

- “What is interesting is that our CTE Enrollments have increased over the past two years while our sending high schools have seen a significant decrease in student enrollment.”
- “Sending high schools don't want me to grow as they would have to pay more tuition. It is a competition for funds and students in seats”

- “Student services coordinator sends out yearly surveys to solicit interest levels from student and compare results with business and industry openings within the region.”
- “We have trouble getting guidance counselors to send students to our region but instead use it as a place for kids they don't know what to do with. We are working on changing this.”

In summary, the perspectives of the practitioners responsible for leading Maine’s CTE schools provided helpful context for the model development work. Existing expenditure and staffing information can only reveal information about the schools’ current practices; this direct feedback from survey responses sheds light on the areas where schools may wish to do more to meet student needs, if funding were available through the cost model.

Model Components

A. Direct Instruction

The direct instruction component of the recommended CTE funding cost model includes personnel costs for three types of employees: teachers, education technicians, and clinical supervisors for healthcare programs. Funding for these staff are determined in a two-step process: first the number of needed staff members is calculated from the applicable student enrollment data; then the salaries of the staff are estimated. Details for each step depend on the type of staff member, and are provided in each section below.

This process is highly dependent on program-level student enrollment data. As discussed in the methods section, both CTEs and the Department of Education may benefit from additional attention and discussion of ways to improve accuracy of data collection and reporting. In addition, discussions with CTE stakeholders elicited an important consideration: enrollments at the program level are more subject to year-to-year fluctuations than overall total enrollment numbers. Because of the tiered structure of the teacher allocations in particular, a small change in the number of students in a program can result in a 0.5 FTE decrease or increase in allocated staff. It would be preferable to use 2- or 3-year average enrollment data as the basis for determining model allocations that are based on student enrollment.

Teachers

Model. The recommended model includes a number of FTE teachers for each *program* depending on the number of students enrolled in the program. The model assumes an average class size of 12 to 16 students and that each teacher can lead two classes (either on alternating days or in morning and afternoon sessions). A half-time teacher is allocated for the first twelve students, or fraction of twelve students, enrolled in a program. If more than 12 students are enrolled in a program, additional teachers are assigned in increments of 0.5 FTEs for every 16 students (or fraction thereof). This method was developed with extensive stakeholder input in prior model development work. It is preferred to the ratio method used in the EPS model for classroom teachers because it allocates teachers in 0.5 FTE increments, and thus more closely matches the practices in CTEs. It also uses programs as the unit for estimating staff needs, rather than using a headcount of all students enrolled in a CTE. This accounts for two factors that are

relevant for the CTE context: 1) students can be enrolled in more than one program, which increases the number of teachers needed, and 2) CTE teachers have very targeted skills and experiences, and cannot readily teach in multiple programs. Since there is often only one teacher per program, the staff needs must be closely aligned to program offerings and enrollments. (Note that the term “program” is used by the Department of Education to denote all offerings in a single C.I.P. code; there can be multiple class sections, or variation in subtopics, within a single program).

The results of the model are shown in Table 5. The majority of programs enroll between 13 and 32 students and are allocated one FTE teacher. Very small programs are allocated a half-time equivalent teacher (0.5 FTE) because they may be offered in only one half day or alternate day course section, rather than two course sections. Larger programs require more than one teacher because they offer more course sections or different concentrations within a program (e.g. both baking and general culinary arts).

Table 5. Recommended Model FTE Teachers

| Students | Number of Programs | Percent of Programs | Model Teacher FTE Per Program | Model Teacher FTE Total |
|-------------|--------------------|---------------------|-------------------------------|-------------------------|
| 12 or fewer | 52 | 17% | 0.5 | 26.0 |
| 13-32 | 201 | 63% | 1.0 | 201.0 |
| 33-39 | 22 | 7% | 1.5 | 33.0 |
| 40-64 | 25 | 8% | 2.0 | 50.0 |
| 65-79 | 7 | 2% | 2.5 | 17.5 |
| 80 or more | 8 | 2% | 3.0 | 24.0 |
| Total | 315 | 100% | | 351.5 |

Actual. In fiscal year 2015-16 CTE schools reported an actual total of 335.0 FTE teachers. The recommended model yields 351.5 FTE teachers, 105% of actual. Due to differences between the student enrollment and human resources data systems, it was not possible to match teachers to programs in all cases. But it was possible to estimate the number of programs with each number or FTE teachers. The majority of programs (67%) had exactly 1.0 FTE teacher, 25% of programs had less than 1.0 FTE teachers (including 16% with exactly 0.5 FTE), and 8% of programs had more than 1.0 FTE teachers.

Response to Stakeholder Feedback and Analysis. The model developed in 2009 included a minimum of 1.0 FTE teachers for each program, even if it contained few enough students to have only one half-day or alternate day section. This would result in an estimated 371.5 FTE teachers using fiscal year 2015-16 data, or 111% of actual. The updated recommended model allows for 0.5 FTE teachers for small programs, which reflects actual practice according to members of the CTE Funding Formula Committee, and is more consistent with analysis of human resources data.

An additional concern was raised by stakeholders in spring 2017 related to the use of average enrollments to represent all programs. Some specialized programs require student ratios below 1:12 for safety or accreditation reasons. Others, such as business programs, could operate with substantially larger classes. It would be possible to have different teacher ratios depending on the specific type of program. This change was not made to the recommended model for three reasons: 1) student ratios are currently managed through the addition of aides (educational technicians), not just through small class sizes (and educational technicians are provided separately for programs with these needs); 2) the model as recommended is overall a good fit at 105% of the current staffing levels, and conforms well to almost all CTEs; and 3) a model using different ratios for each program would be cumbersome to administer and may be more susceptible to swings from year to year.

Several CTE schools operate at more than one location, including island locations. Currently, the enrollments at each location are not reported to the state separately if the programs at the two locations share the same C.I.P. code. If such data were to be collected, it would be possible to allocate FTE Teachers for each location individually.

Teacher Salary Matrix

A teacher salary matrix, which is used in the EPS cost calculations for regular education, provides a greater cost allocation for teachers with more education or more experience. The CTE model also includes a salary matrix. CTE teacher data was analyzed, and an updated teacher salary matrix specific to CTE teachers was calculated with the most recent available human resources data, which was from Fiscal Year 2016. The updated CTE matrix and the teacher salary matrix for regular education are both provided in the Appendix C.

There is, however, a limitation to the updated teacher salary matrix. Teacher contracts give CTE teachers credit toward the salary scale for years of trade experience in addition to

professional experience in education, typically at the rate of one year of credited experience for every two years of trade experience. In past years, when the previous iterations of the CTE cost model were developed, the Maine Department of Education collected data on teacher experience in their trade. In 2016, the Maine DOE did not collect data on teacher experience in their trade outside of professional experience in education. As a result, the updated salary matrix may not be as accurate as in previous years.

Another challenge of having a separate salary matrix for CTE teachers is the smaller number of CTE teachers. The result is a matrix with fewer education and experience categories and one where increases from one category to another are not as smooth.

If the recommended model is adopted, the Department of Education should consider resuming collecting data on years of trade experience for CTE Teachers. Either a new CTE salary matrix may be constructed, or the EPS salary matrix may be used, with credit given for years of trade experience at a rate such as one year credit for every two years trade experience (a practice reported as common in teacher contracts).

Education Technicians

Model. The recommended model allocates education technicians for specified programs identified by the Career and Technical Education Funding Formula Committee. For the programs listed in Table 6 other than Diversified Occupations, the recommended model allocates 1.0 FTE education technician for each program with more than 12 students and 0.5 FTE for each program of 12 or fewer. For Diversified Occupations (also called Employability Skills in data reporting and formerly known as Vocational Special Needs) the recommended model allocates a ratio of 1.0 FTE for each 27 students. The recommended model also includes a minimum of one full time education technician per school. Based on 2015-16 enrollment data, however, every school had at least 1.0 FTE allocated without needing to apply the minimum. Model salaries are calculated at the statewide average for full-time education technicians, \$22,128, with a benefits percentage of 36% from the EPS model.

Table 6. Recommended Model for Ed Techs

| Program | Programs | Students | Ed Techs |
|---|----------|----------|----------|
| Agriculture | 1 | 36 | 1.0 |
| Agricultural Mechanics | 1 | 15 | 1.0 |
| Autobody/Collision and Repair Technology/Technician | 11 | 248 | 11.0 |
| Automobile/Automotive Mechanics Technology/Technician | 24 | 651 | 24.0 |
| Carpentry/Carpenter | 23 | 443 | 20.5 |
| Child Care Provider/Assistant | 18 | 427 | 17.0 |
| Construction Trades | 2 | 44 | 2.0 |
| Crop Production | 1 | 13 | 1.0 |
| Culinary Arts/Chef Training | 21 | 591 | 21.0 |
| Electrician | 10 | 228 | 9.5 |
| Forest Technology/Technician | 4 | 84 | 4.0 |
| Machine Tool Technology/Machinist | 9 | 174 | 8.5 |
| Mason/Masonry | 1 | 18 | 1.0 |
| Plumbing Technology/Plumber | 3 | 54 | 2.5 |
| Sheet Metal Technology/Sheetworking | 1 | 26 | 1.0 |
| Welding Technology/Welder | 16 | 391 | 14.5 |
| Subtotal | 146 | 3,443 | 139.5 |
| Diversified Occupations | 8 | 247 | 9.1 |
| Total Model Ed Techs | 154 | 3,690 | 148.6 |

Actual. In 2015-16 CTE schools reported employing 68.1 actual FTE education technicians. Education technicians are not reported by program.

Response to Stakeholder Feedback and Analysis. The model developed in 2009 would allocate a total of 108.7 total education technicians based on 2015-16 enrollment data, comprising 67.6 schoolwide floating education technician (a ratio of 122 students per education technician for 8,247 students), plus 32 for forestry, child care and electrician programs (one for each program), plus 9.1 for diversified education programs (ratio of 27:1).

According to the CTE Funding Formula Committee, education technicians are generally assigned to a single program rather than floating schoolwide. Thus, the allocation for schoolwide education technicians was replaced with a minimum of 1.0 FTE for each school. The number of specific programs for which an education technician is allocated was expanded based on CTE Funding Formula Committee feedback. The allocation of 0.5 FTE education technicians rather

than 1.0 for smaller programs, those that are allocated only 0.5 FTE teachers, was seen as reflecting actual needs. The number of education technicians allocated in the model is substantially higher than actual practice (by more than double). The stakeholder group saw a need for increasing the number of education technicians to respond to increased demands for adult supervision to promote safety, facilitate student assessments, and enhance instruction. In other words, this model recommendation is based on stakeholders' perceptions that the current level of educational technicians is too low and should not be used as an indicator of adequacy.

Clinical Supervisors for Healthcare Programs

Model. The recommended model includes funds for one clinical supervisor per eight students (or fraction of eight students) in a healthcare program for 90 hours at \$30 per hour. This amounts to \$2,700 for each eight students rounded up and a total of \$345,600 statewide. The programs allocated clinical supervisors are Health Professions and Related Clinical Sciences, Nurse/Nursing Assistant/Aide and Patient Care Assistant, and Emergency Medical Technology.

Actual. Clinical supervisors are not identified as such in the staff data. It was reported that these are typically contracted positions. Clinical supervisor costs are not specifically identified in the financial data. As a result, a comparison of model to actual was not possible with existing data.

Response to Stakeholder Feedback and Analysis. The 2009 model recommended 1.0 FTE clinical supervisor for each healthcare program, and would yield 27 FTE clinical supervisors for 27 healthcare programs statewide. But members of the CTE Funding Formula Committee noted that clinical supervisors are not typically full-time school employees. Rather, they are often contracted clinicians employed only for clinical hours, not regular classroom hours. The number of clinical hours and rate per hour used in the model was based on feedback from the CTE Funding Formula Committee.

B. Central Administration

The central administration component of the recommended CTE funding cost model includes personnel costs for four types of employees—directors, assistant directors, business managers (for CTE regions), and clerical staff—as well as an additional percentage for non-personnel costs.

Administrative Staff

Model. In the recommended model, each school is allocated a Director, regardless of size. Schools with 350 or more students are also allocated a full-time assistant director, and schools between 250 and 350, a half-time assistant director. Each region is allocated a business manager. Clerical staff is allocated at a rate of 1.0 FTE per 245 students with a minimum of 1.0 FTE.

**Table 7. Recommended Model
Central Administration Staff**

| | Director | Assistant Director | Business Manager | Clerical |
|-----------|----------|-----------------------|---------------------|----------|
| Regions | 8 | 3.5 | 8 | 11.6 |
| Centers | 19 | 8.5 | 0 | 26.9 |
| Total FTE | 27 | 12.0 | 8 | 38.5 |

Actual. Actual human resources data is listed in Table 8. Not all directors are reported as full time positions, which results in a FTE total below 27. The recommended model provides for more FTE personnel than the actual in each category except assistant administrator.

Table 8. Actual Central Administration Staff FTE

| | Director | Assistant Administrator | Business Manager | Clerical |
|-----------|----------|----------------------------|---------------------|----------|
| Regions | 8.0 | 5.0 | 6.0 | 11.2 |
| Centers | 16.3 | 9.5 | 0.0 | 20.3 |
| Total FTE | 24.3 | 14.5 | 6.0 | 31.5 |

Notes for Table 8:

1. Assistant Administrators include assistant directors, a dean, curriculum coordinators, CTE evaluators, and a supervisor of instruction. As such, in the financial data, some of the salaries and benefits may be included in student and staff support rather than central administration.
2. All eight regions have a business manager role, but it may be a shared role not reported in the staff data or a different position description.

Response to Stakeholder Feedback and Analysis. In the 2009 model, the same number of Directors and Business Managers would be allocated as the recommended model. However, only the 10 CTE schools that had 350 or more students would be allocated one full-time assistant director each; other CTE schools would not be allocated any assistant administrators. One CTE school had 349 students in 2015-16, and under the former model would not be allocated an assistant administrator. Thus another tier was added to the recommended model, where schools between 250 and 349 students would be allocated a 0.5 FTE assistant administrator, to soften the sharp cut-off at 350 students. In addition, discussions revealed an interrelationship between the need for assistant administrators and student services staff. While the model recommendation for assistant administrators is slightly below actual, this is balanced by provision of additional student support professionals as described below.

In the 2009 model, schools were allocated clerical staff according the same ratio of 1:245. The result would have been 33.5 clerical staff, including 12 schools allocated less than 1.0 FTE. Provision of a minimum 1.0 FTE clerical staff was incorporated into the recommended model to recognize the practical need for front office coverage during operating hours.

Other Central Administration Cost

Model. For administrative costs other than personnel, the recommended model allocates 16% of the personnel model salary and benefits. Table 9 lists the total statewide personnel cost estimate of the recommended model as \$5,771,665. The salaries are from the statewide full-time averages at the position. Benefits percentages are from the EPS model. The additional 16% allocation for non-personnel costs as shown in Table 10 is \$923,466. The additional percentage of 16% was derived from the actual non-personnel expenditure of \$743,769, which was 16% of the actual personnel expenditure of \$4,788,755, also shown in Table 10.

Table 9. Model Central Administration Personnel Cost

| Position | Model FTE | Average Salary | Benefits Percentage | Salary & Benefits Per FTE | Total Personnel Cost |
|---------------------|-------------|----------------|---------------------|---------------------------|----------------------|
| Directors | 27 | 85,998 | 0.14 | 98,038 | 2,647,018 |
| Assistant Directors | 12 | 69,113 | 0.14 | 78,789 | 945,466 |
| Business Managers | 8 | 53,306 | 0.14 | 60,769 | 486,151 |
| Clerical | 38.5 | 34,089 | 0.29 | 43,975 | 1,693,030 |
| Total | 79.6 | | | | 5,771,665 |

Table 10. Model and Actual Total Central Administration Cost

| Cost | Model | Actual |
|-------------------|-----------|-----------|
| Salary & Benefits | 5,771,665 | 4,788,755 |
| Other (16%) | 923,466 | 743,769 |
| Total | 6,695,131 | 5,532,524 |

Actual. The model cost estimate for central administration is 21% higher than actual expenditures, \$6.7 million model vs. \$5.5 million actual, as shown in Table 10. The total actual expenditures for central administration were lower than model salary and benefits alone, even before adding the 16% cost factor for other costs.

Response to Stakeholder Feedback and Analysis. The same methodology was used for other central administration costs in the recommended model as was used in the 2009 model. The calculated additional percentage has not changed. It was 16% based on the most recent expenditure data at the time.

C. Student & Staff Support

The student and staff support category of the recommended CTE funding cost model includes personnel costs for student services coordinators or specialists and additional per student amounts for instructional technology, professional development, co-curricular activities, and safety. This structure mirrors the general EPS model for these components.

Student Services

Model. The recommended model allocates FTE student services staff according to school enrollment as listed in Table 11. Model salaries are calculated as being equal to the statewide full-time average for guidance counselors, \$51,731, with the respective benefits percentage of 28% from the EPS model.

**Table 11. Recommended Model
Student Services**

| Students | FTE | Number of Schools | Model FTE |
|-----------------|-----|----------------------|--------------|
| Less than 200 | 0.5 | 8 | 4.0 |
| 200 - 349 | 1.0 | 9 | 9.0 |
| 350 or more | 1.5 | 10 | 15.0 |
| All CTE Schools | | 27 | 28.0 |

Actual. The position titles of student services coordinator and student services specialist are not available in the staff reporting system. However, CTE regions and centers report other position titles that may be performing the student services role. There are 19 staff representing 13.4 FTE, including 13 guidance counselors representing 11 FTE in 10 schools as well as a school social worker, director of guidance, director of student services, a student monitor, and a volunteer coordinator. Thus the model provides more than double the current level of staff.

Response to Stakeholder Feedback and Analysis. According to members of the CTE Funding Formula Committee, school counselors are available at the home high schools for some services, and the role of “student services coordinator” more accurately reflects the services typically provided in the CTE setting. Student services coordinators may provide supportive assistance and career counseling as well as coordinating on-site training opportunities and programs. Thus, the recommended model now refers to student services coordinators, where prior CTE models had referred to guidance counselors. The 2009 model would allocate 33.0 guidance counselors using a ratio of 1:250 on 8,247 students, the same as the EPS model.

Some stakeholders suggested that each CTE should have a minimum of one full-time student services coordinator. This would ensure that there is always someone on staff to support students in crisis or to assist in an emergency. If this change were implemented, it would result in an additional 0.5 FTE staff member for the eight schools with fewer than 200 students, or a total increase of 4.0 FTE (\$206,924). This suggestion was not adopted because the recommended model amount is already substantially greater than current staffing levels. As always, it is at the discretion of the CTE region or center to staff for the roles and use the position titles they feel best meet the needs of their students. For example, a CTE school may choose to have a full-time student services coordinator using some of the resources provided for a full-time business manager or clerical staff person. The model represents one way of many to use the funding to provide adequate services.

Other Student and Staff Support

Model. The recommended model allocates an amount per pupil for four categories of expenditure: instructional technology, co-curricular activities, professional development, and safety. The amounts are shown in Table 12. For the first three categories, the amount is based on 35% of the regular EPS amount. The amount for safety was arrived at by the stakeholder group developing the 2009 model.

Table 12. Student & Staff Support Categories, Model and actual expenditure amounts

| | 2015 EPS Amount per Pupil | Recommended Model Amount per pupil | Model Total | Actual Total 2015 |
|--------------------------|---------------------------------|---|----------------|-------------------------|
| Technology | 303 | 106 | \$897,914 | \$574,468 |
| Co-Curricular | 117 | 41 | \$346,735 | \$90,621 |
| Professional Development | 61 | 21 | \$180,693 | \$43,025 |
| Safety | n.a. | 40 | \$338,680 | n.a. |
| Total | | | \$1,764,022 | \$708,114 |

Students: 8,467

Actual. The actual expenditure amounts are also included in Table 12. In each category other than safety, the model amount was greater than actual expenditure. Because safety is not a separate category of expenditures—safety is a responsibility of all employees and involves staff time as well as material costs—a comparison of model-to-actual safety costs was not possible.

Response to Stakeholder Feedback and Analysis. No changes were made to the 2009 model other than updating the per-pupil amounts using more recent EPS per-pupil amounts. The amount for safety was not changed.

Some stakeholders suggested that the per-pupil amount for technology was too low, particularly for students in certain technology-rich programs. The per pupil technology allocation in the student support category is intended for general student technology needs – many of which are already provided by the sending school (for example, for high schools that provide 1:1 student devices for all students). Programs with additional technology expenses would receive a higher supply allocation, as described in the following section. Thus the model recommendation was not changed.

D. Supplies

The supplies component of the funding model is based on spending patterns for supplies among similar programs in the state. The spending items included in supplies expenditures in FY 2015 were instructional supplies (66%), other supplies (16%), purchased services (15%) and miscellaneous (2%). The purchased services included repair and maintenance and rentals, while the miscellaneous expenditures included dues, fees, and a small amount of otherwise unspecified goods and services. Note that some purchases that may be considered equipment by the CTE are reported to the state as supplies, specifically if the item costs less than \$1,000.

Model. The recommended model allocates a per-program amount which varies by the program category, listed in Table 13, and an additional amount of \$69 per pupil in all programs.

Table 13. Supplies Recommended Model

| Program Category | Amount |
|-----------------------------|-------------|
| Agriculture | \$6,460 |
| Auto Tech | \$7,919 |
| Autobody | \$8,697 |
| Business | \$853 |
| Child Care | \$1,657 |
| Co-op | \$648 |
| Computer Repair | \$3,405 |
| CTE Academics | \$0 |
| Culinary Arts | \$13,246 |
| Diversified Occupations | \$5,496 |
| Drafting Eng | \$1,509 |
| Electrician | \$8,029 |
| Graphic Arts | \$6,928 |
| Health | \$1,211 |
| Machine Tool | \$5,302 |
| Marketing | \$1,910 |
| Multimedia | \$1,943 |
| Pre-Engineering | \$4,713 |
| Public Safety | \$2,344 |
| Small Engine | \$1,700 |
| Welding | \$10,901 |
| Wood Harvesting et al. | \$9,975 |
| All Other Programs | \$6,154 |
| Additional Per-Pupil | \$69 |

Response to Stakeholder Feedback and Analysis. As with the 2009 model, the per-program and per-pupil amounts for the recommended model were arrived at using regression analysis. The per-program and per-pupil amounts for the 2009 model are listed in Table 14; seven programs had specific rates, and all others used a generic rate. Updated analysis revealed a number of program categories with amounts significantly different from the catch-all amount for “all other programs”. Thus, the recommended model includes specific per-program amounts for a greater number of program categories (22 rather than 7).

Table 14. Supplies 2009 Model

| Program Category | Amount |
|--------------------|----------|
| Agriculture | \$6,758 |
| Auto | \$8,722 |
| Building Trades | \$6,569 |
| Communications | \$5,823 |
| Computer | \$3,881 |
| Culinary | \$13,850 |
| Welding | \$11,369 |
| All Other Programs | \$3,738 |
| Per-Pupil | \$47 |

E. Operation and Maintenance of Plant

Model and Actual. Operation and Maintenance of Plant includes expenditures for personnel, purchased services, insurance, energy, supplies, equipment, and other expenditures for operating and maintaining the buildings and grounds. The recommended model includes \$5.36 per square foot for operation and maintenance of plant, which is the statewide total expenditure on operation and maintenance of plant in CTE schools divided by the statewide total square footage of CTE school facilities.

Two models were compared, one allocating an amount per square foot and another allocating an amount per pupil. The amount-per-square-foot model was a closer fit to actual expenditures and is the recommended model. In the EPS model for elementary and high schools, the opposite is true: the per-pupil model is a better fit and is used. The 2009 CTE model also allocated an amount per square foot.

Response to Stakeholder Feedback and Analysis. In analyzing model fit, it was evident that the Regions are currently spending more per square foot than Centers on operation and maintenance. This was the only model category where there was a clear pattern of difference between Centers and Regions. By using the average spending amount of all CTEs, most Regions would receive an allocation that is lower than current expenditures, while most Centers would receive more than they are spending. Researchers were unable to explain an underlying cause for this difference in spending. If policymakers and stakeholders have a plausible reason for differentiating facility needs based on Region vs. Center structure, it would be justifiable to use different per square footage allocation amount for each group, which would be \$6.96 for Regions and \$4.58 for Centers based on FY2015 data.

It was noted in the data verification process that some of the square footage amounts on record with the Maine Department of Education were not current. In addition, there are recent construction projects that will be completed in the near future. Once complete, spending patterns may change substantially from the FY2015 data used for this analysis. Before a CTE finding model is implemented this component should be re-calculated based on more current data (for both total square footage and expenditures).

F. Student Assessment

Response to Stakeholder Feedback and Analysis: The 2009 model did not include a separate allocation for student assessment. Stakeholders suggested a separate component or sub-component for student assessments due to the increasing use of industry standard assessments. As such assessments become more frequently used by CTE schools to evaluate student learning, the costs have been increasing. This trend is expected to continue with implementation of state policies regarding proficiency-based high school diplomas that encourage use of industry-recognized assessments. A complete analysis of the actual expenditure by CTE schools on industry standard assessments was not possible using available data. The industry standard assessments are included in the financial data under supplies or student support, but may not be reported separately from all other costs.

In a cost model for CTE funding, amounts for programs with industry standard assessments students may be based on enrollment in the program and the price of its associated assessment(s). The resulting allocation amount may be included as an additional amount within

either the Supplies or Other Student & Staff Support components, or as its own separate component.

G. Equipment

Spending on equipment purchases is, naturally, more variable for CTE than for regular education. According to stakeholders, different programs need different amounts of equipment and different replacement schedules due to dissimilar costs and rates of depreciation or obsolescence. A program may need to make very large equipment expenditures one year and then not need new equipment for years. The result is that annual equipment expenditures by each CTE and for each program are not accurately predictable. Stakeholders listed the need for equipment funding (along with construction) as a major barrier to expanding existing programs and starting up new programs. They also stressed the importance of equipment in keeping programs current and relevant. For these reasons, equipment was not included in the recommended model for calculating the annual operating cost of CTE programs. Rather, a system should be considered where CTE regions and centers have access to a special fund for equipment purchases to provide for new and replacement equipment needed for new, expanded, and existing programs. Creative use of other funding sources, such as in-kind contributions from local businesses as well as federal Perkins Grant funds, should be continued, facilitated, and encouraged.

The actual Fiscal Year 2015 expenditure for equipment was \$739,322 in general fund. The four-year average annual expenditure for equipment in Fiscal Years 2005 through 2008 was \$996,563 in general fund. Adjusted for inflation, this equates to \$1,139,192 in 2015 dollars. These general fund amounts, or a state share based on them, may give a good indication of the approximate amount needed each year for a special CTE equipment fund.

CTE regions and centers also used Perkins Grant funds for equipment purchases. Spending from these grants amounted to \$598,366 in Fiscal Year 2015 and an annual average of \$417,884 per year in Fiscal Years 2005 through 2008.

Response to Stakeholder Feedback and Analysis: Some stakeholders expressed concerns about a separate process for accessing equipment funds, citing potential for delays and/or denial of funds for needed purchases. Reliance on a separate fund for equipment needs presumes development of an administrative process that is efficient and appropriate for meeting CTE school needs.

H. Construction

Major capital expenditures and debt service are funded outside the Essential Programs and Services funding system, even for regular education. The state participates in funding for major construction projects using a prioritized list, selecting projects based on available funding for the year. The state share is forgiven immediately and the local share is paid over time in future years. CTE schools are currently eligible, technically, for this funding. However, according to stakeholder feedback, they have trouble competing with the needs of regular schools to make the prioritized list. Since many CTE programs have long waiting lists, and stakeholders listed construction funding as a major barrier to creating new programs and expanding fully subscribed programs, construction and renovation is an area of high priority. It is possible that student access may be improved by allocating a portion of construction funds specifically toward CTE, with a separate prioritized list of proposed CTE construction projects. A policy change to separate CTE construction funding should be considered.

I. Transportation & Special Education

Student transportation from the high school or from home to the CTE school, as well as transportation to work sites and clinical sites, is funded through the EPS Transportation component. Thus transportation is not recommended as a separate component in the CTE funding model, as it would be redundant.

Similarly, the EPS Special Education component allocates resources to the sending districts for students with special needs. The CTE funding model parameters were based on the expectation that special education services would be provided by the sending SAU and not the CTE. Individualized plans for each special education student should address any needs for supporting them throughout their school program, including time spent in CTEs. Because the prevalence rate of students with special education needs is higher in CTEs than that seen overall in sending high schools, it merits further investigation to assess whether students with special needs who are enrolled in CTE programs are adequately supported. If not, a variety of policy options could be pursued to increase student support during their time spent at CTE sites, including provision of additional staff at CTE schools.

Summary Comparison of Model and Actual Expenditure

Table 15 shows a comparison by component of statewide actual expenditures by CTE regions and centers to the calculated FY15 cost in the recommended model. Equipment, construction, and assessment components are not included in the comparison. Statewide, the calculated cost in the model is 12%, or \$5.1 million, higher than actual FY15 expenditure. The model amount beyond actual expenditures are primarily in instruction (\$3.4 million) and central administration (\$1.2 million) and to a lesser degree in other student and staff support (\$0.2 million) and Operation and Maintenance of Plant (\$0.3 million).

The correlations represent how closely the model matches differences in actual expenditures among all the CTE schools throughout the state. The high 0.88 correlation for the totals means that there is a close relation between the amount of recommended spending in the model and the amount of actual spending in the regions and centers. The moderate correlation of 0.42 in the supply component means the actual spending on supplies does not match up as closely with costs recommended by the model, perhaps due to wider variation in among schools in the spending on supplies. The r-squared of 0.77 for the total means that 77% of the differences in expenditures among the CTE schools match up with the differences in the calculated costs from the model.

Similar comparisons of actual expenditure to calculated cost for regions only and for centers are shown in Table 16 and Table 17, respectively. Regions overall spent the same as the calculated model cost, 100% or \$16.1 million (see Table 16). Centers spent less than the calculated model cost (Table 17). As noted in section E, Operation and Maintenance of Plant, Centers and Regions exhibited differences in facilities spending; all other categories had variation that was not clearly related to the CTE governance structure.

Table 15. Comparison of Actual Expenditure to Recommended Model (\$millions)

| | Total | Direct Instruction | Central Admin | Supplies | Operation and Maint. | Other Student/ Staff Support |
|-------------------|-------------|--------------------|---------------|-------------|----------------------|------------------------------|
| 2015 Expenditure | \$43.7 | \$24.6 | \$5.5 | \$2.3 | \$7.8 | \$3.4 |
| Recommended Model | \$48.7 | \$28.0 | \$6.7 | \$2.3 | \$8.1 | \$3.6 |
| <i>Percent</i> | <i>112%</i> | <i>114%</i> | <i>121%</i> | <i>100%</i> | <i>103%</i> | <i>106%</i> |
| Correlation | 0.88 | 0.85 | 0.72 | 0.42 | 0.72 | 0.48 |
| r-squared | 0.77 | 0.73 | 0.52 | 0.18 | 0.52 | 0.23 |

Table 16. Regions Only Comparison of Actual Expenditure to Recommended Model (\$millions)

| | Total | Direct Instruction | Central Admin | Supplies | Operation and Maint. | Other Student/ Staff Support |
|-------------------|-------------|--------------------|---------------|-------------|----------------------|------------------------------|
| 2015 Expenditure | \$16.1 | \$8.6 | \$2.1 | \$0.8 | \$3.3 | \$1.3 |
| Recommended Model | \$16.1 | \$8.9 | \$2.4 | \$0.8 | \$2.8 | \$1.2 |
| <i>Percent</i> | <i>100%</i> | <i>103%</i> | <i>113%</i> | <i>101%</i> | <i>84%</i> | <i>93%</i> |
| Correlation | 0.75 | 0.83 | 0.57 | 0.31 | 0.45 | -0.14 |
| r-squared | 0.56 | 0.69 | 0.32 | 0.10 | 0.21 | 0.02 |

Table 17. Centers Only Comparison of Actual Expenditure to Recommended Model (\$millions)

| | Total | Direct Instruction | Central Admin | Supplies | Operation and Maint. | Other Student/ Staff Support |
|-------------------|-------------|--------------------|---------------|------------|----------------------|------------------------------|
| 2015 Expenditure | \$27.6 | \$15.9 | \$3.4 | \$1.6 | \$4.5 | \$2.2 |
| Recommended Model | \$32.7 | \$19.1 | \$4.3 | \$1.5 | \$5.3 | \$2.4 |
| <i>Percent</i> | <i>119%</i> | <i>120%</i> | <i>126%</i> | <i>99%</i> | <i>118%</i> | <i>114%</i> |
| Correlation | 0.93 | 0.90 | 0.70 | 0.42 | 0.83 | 0.66 |
| r-squared | 0.87 | 0.80 | 0.50 | 0.18 | 0.69 | 0.44 |

The model calculated cost and actual expenditure for each CTE region and center are shown in Table 18 along with a comparison showing the amount of the model above or below actual spending. The net difference overall is \$5.1 million, which comes from \$6.8 million above actual in regions and centers where the model is above actual minus \$1.7 million below actual in regions and centers where the model amount is below actual.

Table 18. Recommended Model Amount Above or Below Actual 2015 Expenditure

| CTE School | Model* Total | Actual** Expenditure | Model Amount Below Actual | Model Amount Above Actual |
|--------------------------------------|-------------------|-------------------------|------------------------------------|------------------------------------|
| Maine Region Ten Technical High Sch | 1,796,808 | 1,919,391 | (122,582) | - |
| Mid-Coast School of Technology | 2,695,948 | 2,823,467 | (127,519) | - |
| No Penobscot Tech-Region 3 | 1,468,144 | 1,700,279 | (232,135) | - |
| Oxford Hills Tech - Region 11 | 2,704,986 | 2,908,595 | (203,609) | - |
| Region 9 School of Applied Tech. | 1,365,822 | 1,677,629 | (311,806) | - |
| Region Two | 1,465,516 | 1,234,065 | - | 231,451 |
| United Technologies Ctr-Region 4 | 2,769,901 | 2,116,925 | - | 652,976 |
| Waldo County Tech Ctr-Region 7 | 1,811,847 | 1,739,126 | - | 72,721 |
| <i>Regions Subtotal</i> | <i>16,078,973</i> | <i>16,119,476</i> | <i>(997,651)</i> | <i>957,148</i> |
| Bath Regional Vocational Center | 1,438,634 | 1,159,538 | - | 279,096 |
| Biddeford Regional Ctr of Tech | 1,842,839 | 1,687,459 | - | 155,380 |
| Capital Area Technical Center | 2,281,586 | 1,898,851 | - | 382,734 |
| Caribou Regional Technology Ctr | 1,444,602 | 1,505,541 | (60,939) | - |
| Coastal Wash Cty Inst of Tech | 514,240 | 183,982 | - | 330,258 |
| Foster Regional Applied Tech Ctr | 2,121,248 | 1,389,052 | - | 732,196 |
| Hancock County Technical Center | 1,208,585 | 950,802 | - | 257,783 |
| Lake Region Vocational Center | 1,238,618 | 1,273,636 | (35,018) | - |
| Lewiston Regional Technology Ctr | 3,483,365 | 2,809,195 | - | 674,170 |
| Mid-Maine Technical Center | 2,289,197 | 1,661,366 | - | 627,831 |
| Portland Arts & Technology H S | 3,648,321 | 2,950,356 | - | 697,965 |
| Presque Isle Reg Career & Tech Ctr | 1,150,602 | 1,455,505 | (304,902) | - |
| Sanford Regional Technical Center | 2,341,389 | 1,779,845 | - | 561,543 |
| Somerset Career & Technical Center | 1,767,926 | 1,265,023 | - | 502,903 |
| St Croix Regional Technical Center | 1,040,597 | 830,699 | - | 209,898 |
| St John Valley Technology Center | 970,006 | 723,553 | - | 246,454 |
| Tri-County Technical Center | 1,376,609 | 1,414,733 | (38,124) | - |
| Van Buren Regional Technology Ctr | 420,065 | 251,705 | - | 168,360 |
| Westbrook Regional Vocational Center | 2,080,919 | 2,360,737 | (279,818) | - |
| <i>Centers Subtotal</i> | <i>32,659,349</i> | <i>27,551,579</i> | <i>(718,802)</i> | <i>5,826,572</i> |
| Total | 48,738,322 | 43,671,055 | (1,716,453) | 6,783,720 |

* Does not include assessment, equipment or construction funds.

Net: 5,067,267

** Includes assessment expenditures but not equipment or construction

Researcher Recommendations

In response to stakeholder feedback and analysis, the researchers have several recommendations and policy options for consideration by the Maine Department of Education as they plan their recommendations to the Education Committee.

Table 19. Policy Options and Recommendations

| Policy Option/Recommendation | Rationale | Approximate Annual Cost |
|---|---|--|
| <p>1. <i>Implementation.</i> Implement the recommended cost-based CTE funding model to replace the current, expenditure-based model for direct instruction, central administration, student & staff support, supplies, and operation & maintenance.</p> | <p>The current funding system for CTE may not be providing equitable opportunities to all CTE students statewide.</p> | <p>\$5.1 million above current level upon full implementation, plus assessment component. \$1.7 million in the first year if a 3-year ramp up.</p> |
| <p>a. <i>Transition.</i> Establish a transition period including a hold harmless provision and ramped funding.</p> | <p>A hold harmless provision is recommended to prevent CTE schools that have been providing higher levels of resources for CTE from experiencing a reduction in state subsidy. Ramped funding can make funding increases more feasible for the state and institute time to plan program improvements to promote optimal use of predictable new resources.</p> | <p>\$1.7 million additional for first year hold harmless provision if immediate full implementation, \$0.6 million assuming a 3-year ramp up.</p> |
| <p>b. <i>Targeted funding.</i> Make CTE funding targeted or partially targeted and provide the state share directly to CTE regions.</p> | <p>At least partial targeting of new CTE funding is recommended to assure that new CTE funding is used to improve CTE programming rather than other SAU or municipal priorities.</p> | <p>No net cost. Assures state funding goes to CTE.</p> |
| <p>c. <i>New and Expanded Programs.</i> Allow approved new programs and program expansions to be subsidized immediately upon startup.</p> | <p>The current funding system involves a two-year lag for new actual expenditures to become part of the subsidized cost allocation.</p> | <p>Dependent upon program approval, which may be subject to available funds.</p> |

| | | |
|--|--|--|
| <p>2. <i>Assessment.</i> Develop and include a separate cost category for industry standard assessments</p> | <p>As industry standard assessments become more widely used, past practice will be less predictive of future expenditure needs.</p> | <p>Cost TBD as industry standard assessment price and use data is collected</p> |
| <p>3. <i>Equipment.</i> Allow access to a special fund, such as the revolving renovation fund, for equipment purchases to provide for new and replacement equipment.</p> | <p>Expenditure on equipment varies widely from year to year. Cost is not directly related to past expenditure and is not uniform. Additional equipment expenditure is needed for new programs, expanded programs, and equipment replacement.</p> | <p>No additional cost; cost is estimated to be similar to current cost, which is \$700 thousand to \$1 million per year.</p> |
| <p>4. <i>Construction.</i> CTE schools should have their own separate prioritized list for state supported school construction projects.</p> | <p>Facility space was identified as a major barrier to expanding programs where waitlists of students exist, and to establishing new high demand programs. Nevertheless, CTE schools have had trouble competing with regular education schools to become priorities in SAU applications and state approvals.</p> | <p>Subject to policymaker decisions making funding available.</p> |
| <p>5. <i>Local Share and Cost Sharing.</i> The EPS local share for each member SAU can be calculated by separating the portion of the mill rate expectation for CTE and applying it separately. Additional local amounts may also be assessed.</p> | <p>Local share for centers and their members to be based on each community's own ability to pay, not only the SAU operating the center. Ensuring that both regions and centers have mechanisms for raising additional funds beyond the cost model, such as through assessments, is important for allowing local communities to continue to control resources provided for CTE.</p> | <p>No additional cost.</p> |
| <p>6. <i>Data Collection.</i> Continue to improve the detail and quality of the data provided to the state by the CTE schools.</p> | <p>Additional data on industry experience of CTE teachers, enrollments at satellite locations, industry standard assessment cost and usage, and CTE usage within mixed use buildings before implementation will improve funding model accuracy.</p> | <p>No additional cost for routine improvements and changes.</p> |

Each of the policy options listed in Table 19 is intended to enhance the adequacy and equity of CTE funding in Maine. It is hoped that implementation of a cost model for CTE will improve student access to quality education through a funding system based on programmatic needs instead of historical spending patterns.

In closing, Table 20 summarizes the estimated cost comparison of the current expenditure-based CTE funding model to the proposed cost-based model, in 2015 dollars. The estimate for the five components is provided. The \$48.7 million estimated total allocation includes both the state and local share for the model components of direct instruction, central administration, student & staff support, supplies, and operation & maintenance. The cost of assessment, equipment, and construction are subject to additional data and policymaker decisions.

Table 20. Summary Annual Cost Estimate of Current and Proposed Funding Models

| Cost Categories | Current (Expenditure) Model | Proposed (Cost) Model | Difference |
|---|--|--|-------------------|
| Direct instruction, central administration, student & staff support, supplies, and operation & maintenance of plant | \$43.7 million | \$48.7 million (full implementation) | \$5.1 million |
| Assessment | Included in above total | To be determined using assessment price and usage data | Undetermined |
| Equipment | Approx. \$0.7 to \$1.0 million | Decided through policymaking process | Undetermined |
| Construction | Varies depending on state approved and local construction projects | Decided through policymaking process | Undetermined |

Appendix A: CTE Participation Rate by High School

| School Name | CTE Students (11th & 12th Gr.) | 11th & 12th Gr. Enrollment | Jr. & Sr. CTE Participation Rate | Percent Eligible FRPL |
|-----------------------------------|--------------------------------|----------------------------|----------------------------------|-----------------------|
| Arthur R. Gould Sch--LCYDC | ≤5 | 27 | * | 32% |
| Ashland District School | ≤5 | 51 | * | 59% |
| Bangor High School | 105 | 546 | 19% | 44% |
| Belfast Area High School | 81 | 283 | 29% | 50% |
| Biddeford High School | 166 | 390 | 43% | 48% |
| Bonny Eagle High School | 130 | 543 | 24% | 38% |
| Boothbay Region High School | 21 | 99 | 21% | 45% |
| Brewer High School | 98 | 347 | 28% | 39% |
| Brunswick High School | 86 | 427 | 20% | 28% |
| Buckfield Jr-Sr High School | 23 | 79 | 29% | 58% |
| Bucksport High School | 39 | 152 | 26% | 52% |
| Calais Middle/High School | 63 | 99 | 64% | 54% |
| Camden Hills Regional H S | 50 | 320 | 16% | 31% |
| Cape Elizabeth High School | 10 | 291 | 3% | 9% |
| Caribou High School | 92 | 213 | 43% | 41% |
| Carrabec High School | 32 | 105 | 30% | 55% |
| Casco Bay High School | 27 | 165 | 16% | 48% |
| Central Aroostook Jr-Sr H S | ≤5 | 70 | * | 41% |
| Central High School | 45 | 166 | 27% | 52% |
| Cony | 120 | 343 | 35% | 55% |
| Deer Isle-Stonington High Sch | 7 | 58 | 12% | 40% |
| Deering High School | 66 | 456 | 14% | 64% |
| Dexter Regional High School | 64 | 166 | 39% | 62% |
| Dirigo High School | 53 | 150 | 35% | 48% |
| East Grand School | 12 | 25 | 48% | 73% |
| Easton Junior-Senior High Sch | ≤5 | 40 | * | 34% |
| Edward Little High School | 63 | 465 | 14% | 47% |
| Ellsworth High School | 77 | 230 | 33% | 33% |
| Falmouth High School | 14 | 354 | 4% | 6% |
| Forest Hills Consolidated School | ≤5 | 23 | * | 43% |
| Fort Fairfield Middle/High School | ≤5 | 66 | * | 49% |
| Fort Kent Community High School | 48 | 138 | 35% | 43% |
| Freeport High School | 47 | 241 | 20% | 20% |
| Gardiner Area High School | 45 | 299 | 15% | 46% |
| Gorham High School | 56 | 394 | 14% | 24% |
| Gray-New Gloucester High School | 45 | 251 | 18% | 33% |
| Greely High School | 38 | 343 | 11% | 9% |
| Greenville Consolidated School | 7 | 35 | 20% | 50% |

| | | | | |
|-----------------------------------|-----|-----|-----|-----|
| Hall-Dale High School | 26 | 166 | 16% | 30% |
| Hampden Academy | 88 | 367 | 24% | 26% |
| Hermon High School | 110 | 257 | 43% | 30% |
| Hodgdon High School | ≤5 | 75 | * | 61% |
| Houlton High School | 80 | 156 | 51% | 99% |
| Islesboro Central School | ≤5 | 21 | * | 33% |
| Jonesport-Beals High School | ≤5 | 34 | * | 66% |
| Katahdin Middle/High School | 26 | 52 | 50% | 69% |
| Kennebunk High School | 58 | 351 | 17% | 18% |
| Lake Region High School | 80 | 261 | 31% | 52% |
| Lawrence High School | 100 | 328 | 30% | 53% |
| Leavitt Area High School | 52 | 276 | 19% | 39% |
| Lewiston High School | 299 | 620 | 48% | 66% |
| Limestone Community School | ≤5 | 34 | * | 79% |
| Lisbon High School | 38 | 167 | 23% | 43% |
| Machias Memorial High School | 24 | 46 | 52% | 63% |
| Madawaska Middle/High School | 24 | 71 | 34% | 43% |
| Madison Area Memorial H S | 37 | 132 | 28% | 55% |
| Maine Academy of Natural Sciences | ≤5 | 31 | * | 51% |
| Maine Connections Academy | ≤5 | 55 | * | 52% |
| Maranacook Community High Sch | 38 | 210 | 18% | 37% |
| Marshwood High School | 54 | 376 | 14% | 6% |
| Massabesic High School | 113 | 509 | 22% | 40% |
| Mattanawcook Academy | 66 | 164 | 40% | 55% |
| ME Sch of Science & Mathematics | ≤5 | 97 | * | 4% |
| Medomak Valley High School | 74 | 238 | 31% | 52% |
| Messalonskee High School | 107 | 410 | 26% | 34% |
| Monmouth Academy | 12 | 103 | 12% | 25% |
| Morse High School | 85 | 290 | 29% | 39% |
| Mountain Valley High School | 33 | 186 | 18% | 68% |
| Mountain View Youth Dev Ctr | ≤5 | 11 | * | 29% |
| Mt Abram Regional High School | 44 | 117 | 38% | 59% |
| Mt Ararat High School | 76 | 378 | 20% | 35% |
| Mt Blue High School | 222 | 345 | 64% | 47% |
| Mt Desert Island High School | 30 | 251 | 12% | 29% |
| Mt View High School | 90 | 211 | 43% | 65% |
| Narraguagus High School | 29 | 94 | 31% | 58% |
| Noble High School | 99 | 429 | 23% | 39% |
| Nokomis Regional High School | 86 | 338 | 25% | 54% |
| North Haven Community School | ≤5 | 13 | * | 5% |
| Oak Hill High School | 52 | 202 | 26% | 40% |
| Oceanside High School** | 113 | 237 | 48% | 51% |
| Old Orchard Beach High School | 16 | 115 | 14% | 51% |

| | | | | |
|----------------------------------|-------|--------|-----|------|
| Old Town High School | 45 | 239 | 19% | 48% |
| Orono High School | 31 | 181 | 17% | 28% |
| Oxford Hills Comprehensive H S | 278 | 537 | 52% | 58% |
| Penobscot Valley High School | 28 | 82 | 34% | 52% |
| Penquis Valley High School | 20 | 87 | 23% | 67% |
| Piscataquis Community School | 24 | 116 | 21% | 60% |
| Poland Regional H S | 50 | 232 | 22% | 40% |
| Portland High School | 75 | 468 | 16% | 54% |
| Presque Isle High School | 151 | 261 | 58% | 42% |
| Rangeley Lakes Regional School | 6 | 23 | 26% | 41% |
| Richmond High School | 13 | 62 | 21% | 41% |
| Robert W Traip Academy | 7 | 132 | 5% | 25% |
| Sacopee Valley High Sch | 49 | 179 | 27% | 54% |
| Sanford High School | 156 | 499 | 31% | 57% |
| Scarborough High School | 39 | 509 | 8% | 16% |
| Schenck High School | 14 | 62 | 23% | 55% |
| Searsport District High School | 36 | 76 | 47% | 56% |
| Shead High School | ≤5 | 60 | * | 54% |
| Skowhegan Area High School | 166 | 385 | 43% | 67% |
| So Aroostook School | 24 | 51 | 47% | 72% |
| South Portland High School | 49 | 438 | 11% | 37% |
| Spruce Mountain High School | 50 | 222 | 23% | 49% |
| Stearns Jr-Sr High School | 24 | 91 | 26% | 48% |
| Sumner Memorial High School | 20 | 104 | 19% | 57% |
| Telstar High School | 29 | 122 | 24% | 58% |
| Upper Kennebec Valley Senior HS | 12 | 28 | 43% | 100% |
| Van Buren District Secondary Sch | 28 | 39 | 72% | 60% |
| Vinalhaven School | ≤5 | 34 | * | 49% |
| Washburn District High School | ≤5 | 61 | * | 57% |
| Waterville Senior High School | 92 | 257 | 36% | 56% |
| Wells High School | 23 | 221 | 10% | 18% |
| Westbrook High School | 133 | 291 | 46% | 56% |
| Windham High School | 68 | 529 | 13% | 32% |
| Winslow High School | 72 | 208 | 35% | 43% |
| Winthrop High School | 17 | 111 | 15% | 28% |
| Wiscasset High School** | 19 | 94 | 20% | 58% |
| Wisdom Middle High School | 26 | 56 | 46% | 45% |
| Woodland Jr-Sr High School | 10 | 73 | 14% | 52% |
| Yarmouth High School | 16 | 258 | 6% | 9% |
| York High School | 20 | 309 | 6% | 15% |
| State High School Total | 6,116 | 24,655 | 25% | 43% |

* Data suppressed (fewer than 5 students)

** Based on FY2016 data estimates

Appendix B: Listing of Available Programs by Total Enrollment

Table B1. Programs and Students 2016

| Program | School Programs | Students |
|--|--------------------|----------|
| Health Professions and Related Clinical Sciences | 22 | 849 |
| Automobile/Automotive Mechanics Technology/Technic | 24 | 651 |
| Culinary Arts/Chef Training | 21 | 591 |
| Carpentry/Carpenter | 23 | 443 |
| Child Care Provider/Assistant | 18 | 427 |
| Welding Technology/Welder | 16 | 391 |
| Job-Seeking/Changing Skills | 2 | 343 |
| Criminal Justice/Police Science | 10 | 274 |
| Computer Installation and Repair Technology/Techni | 14 | 269 |
| Autobody/Collision and Repair Technology/Technicia | 11 | 248 |
| Cooperative Education | 4 | 243 |
| Electrician | 10 | 228 |
| Business Administration and Management, General | 4 | 189 |
| Security and Protective Services | 6 | 176 |
| Machine Tool Technology/Machinist | 9 | 174 |
| Vocational Special Needs | 6 | 163 |
| Administrative Assistant and Secretarial Science, | 4 | 157 |
| Applied Academics | 8 | 151 |
| Business/Office Automation/Technology/Data Entry | 3 | 141 |
| Drafting and Design Technology/Technician, General | 7 | 122 |
| Commercial and Advertising Art | 6 | 118 |
| Small Engine Mechanics and Repair Technology/Techn | 4 | 93 |
| Career Cluster Exploration | 3 | 92 |
| Cinematography and Film/Video Production | 4 | 86 |
| Radio and Television Broadcasting Technology/Techn | 4 | 85 |
| Forest Technology/Technician | 4 | 84 |
| Graphic and Printing Equipment Operator, General P | 2 | 84 |
| Heavy Equipment Maintenance Technology/Technician | 3 | 84 |
| Employability Skills | 2 | 84 |
| Information Technology | 1 | 81 |
| Engineering Technologies/Technicians | 2 | 69 |
| Fire Science/Fire-fighting | 5 | 55 |
| Plumbing Technology/Plumber | 3 | 54 |
| Truck and Bus Driver/Commercial Vehicle Operation | 5 | 54 |
| Applied Horticulture/Horticulture Operations, Gene | 4 | 51 |
| Career Exploration/Awareness Skills | 1 | 49 |

Table B1. Programs and Students 2016 (cont'd)

| Program | School Programs | Students |
|--|--------------------|----------|
| Tech Lab/Intro to Technology | 1 | 48 |
| Prepress/Desktop Publishing and Digital Imaging De | 1 | 46 |
| Visual and Performing Arts, General | 1 | 46 |
| Graphic Design | 2 | 46 |
| Construction Trades | 2 | 44 |
| Marine Maintenance/Fitter and Ship Repair Technolo | 2 | 42 |
| Nurse/Nursing Assistant/Aide and Patient Care Assi | 3 | 41 |
| Accounting Technology/Technician and Bookkeeping | 3 | 39 |
| Sales, Distribution, and Marketing Operations, Gen | 1 | 39 |
| Agriculture, Agriculture Operations, and Related S | 1 | 36 |
| Pre- Engineering | 1 | 36 |
| Marketing/Marketing Management, General | 2 | 35 |
| Mass Media Communications | 1 | 34 |
| Hospitality and Recreation Marketing Operations | 1 | 34 |
| Emergency Medical Technology | 2 | 30 |
| Food Preparation/Professional Cooking/Kitchen Assi | 1 | 29 |
| Business Careers Academy | 1 | 29 |
| Architectural Drafting and Architectural CAD/CADD | 1 | 27 |
| Sheet Metal Technology/Sheetworking | 1 | 26 |
| Retailing and Retail Operations | 1 | 24 |
| Parks, Recreation and Leisure Facilities Managemen | 1 | 23 |
| Mason/Masonry | 1 | 18 |
| Construction/Heavy Equipment/Earthmoving Equipment | 2 | 17 |
| Materials Engineering | 1 | 16 |
| Agricultural Mechanics and Equipment/Machine Techn | 1 | 15 |
| Crop Production | 1 | 13 |
| Electrical/Electronics Equipment Installation and | 1 | 12 |
| Hospitality | 1 | 10 |
| General Office Occupations and Clerical Services | 1 | 3 |
| Total | 315 | 8,467 |

Appendix C: Teacher Salary Matrix

Table C1. CTE Teacher Salary Matrix

| Years of Experience | Education Category | | |
|---------------------|---------------------|-----------|-------------------|
| | Less than Bachelors | Bachelors | Masters or Higher |
| up to 5 | 1.00 | 1.06 | 1.13 |
| 6-15 | 1.17 | 1.22 | 1.29 |
| 16-20 | 1.28 | 1.33 | 1.40 |
| 21-25 | 1.39 | 1.44 | 1.52 |
| 26 or more | 1.43 | 1.49 | 1.56 |

Table C2. EPS Teacher Salary Matrix

| Years of Experience | Education category | | | | |
|---------------------|--------------------|-----------------|---------------|---------------------|------|
| | BA only | BA + 15 or + 30 | MA or MA + 15 | MA + 30 or adv cert | Doc. |
| 0 | 1.00 | 1.04 | 1.16 | 1.24 | 1.25 |
| 1-5 | 1.07 | 1.11 | 1.23 | 1.31 | 1.32 |
| 6-10 | 1.22 | 1.27 | 1.38 | 1.47 | 1.47 |
| 11-15 | 1.39 | 1.44 | 1.55 | 1.63 | 1.64 |
| 16 - 20 | 1.56 | 1.60 | 1.72 | 1.80 | 1.81 |
| 21 - 25 | 1.68 | 1.73 | 1.84 | 1.93 | 1.93 |
| 26 - 30 | 1.74 | 1.79 | 1.90 | 1.98 | 1.99 |
| 31+ | 1.76 | 1.80 | 1.92 | 2.00 | 2.01 |