Preliminary Report

Development of a Funding Model for Career and Technical Education

Maine Education Policy Research Institute
University of Maine/Orono
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Career and Technical Education in Maine

Career and Technical Education (CTE) is offered to high school students in Maine at 27 schools throughout the state. A map of the school locations appears at the end of the appendix. CTE schools are defined as regions (8 schools) or centers (19 schools). The difference between regions and centers predominantly lies in the governance structure. The Maine Department of Education defines regions and centers in Chapter 313, Title 20A of the MRSA.

> **A region is defined 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.
>
> **A center is defined as**
> an administrative entity established pursuant to this chapter 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.

During the 2005 – 2006 school year 8,153 students participated in CTE programs. More than 350 programs are offered in 68 different program areas, or Classification of Instructional Program (CIP) codes. The more popular programs, such as carpentry and auto tech are offered in almost all schools; programs such as agriculture, aquaculture, and marine maintenance that are more closely tied to local culture are only offered in a couple of schools. A list of programs is included in Table A-1 in the appendix. The range of enrollments at CTE schools is wide, ranging from just 21 students to more than 600 students. The regions and centers are listed in Table 1.

Table 1. CTE Regions and Centers

School		Location	Enrollment (2005 - 2006)
Centers	Bath Regional Vocational Center	Bath	307
	Biddeford Regional Center of Technology	Biddeford	382
	Capital Area Technical Center	Augusta	375
	Caribou Technology Center	Caribou	239
	Hancock County Technical Center	Ellsworth	113
	Kenneth Foster Applied Technology Center	Farmington	519
	Lake Region Vocational Center	Naples	173
	Lewiston Regional Technical Center	Lewiston	651
	Mid-Maine Technical Center	Waterville	323
	Portland Arts and Technology High School	Portland	597
	Presque Isle Technology Center	Presque Isle	261
	St. Croix Regional Technical Center	Calais	143
	St. John Valley Technology Center	Frenchville	123
	Sanford Regional Vocational Center	Sanford	443
	Skowhegan Regional Vocational Center	Skowhegan	216
	Tri-County Technical Center	Dexter	209
	Van Buren Regional Technology Center	Van Buren	21
	Westbrook Regional Vocational Center	Westbrook	366
	Coastal Washington County Institute of Technology	Machias	176
Regions	Region 2, Southern Aroostook County	Houlton	238
	Region 3, Northern Penobscot Technical Center	Lincoln	234
	Region 4, United Technologies Center	Bangor	465
	Region 7, Waldo County Technical Center	Waldo	280
	Region 8, Mid-Coast School of Technology	Rockland	347
	Region 9, School of Applied Technology	Mexico	146
	Region 10	Brunswick	235
	Region 11, Oxford Hills Technical School	Norway	571

Approximately $37 million in state and local funds was spent on CTE during the 2005 – 2006 school year. The model for state funding the cost of CTE programs has historically been a percentage reimbursement model based on historical expenditures, specifically two-year old expenditures inflated to the current year. Districts are funded a percentage of the expenses incurred if the district operates a center, or the amount of the tuition or assessment paid by the district to the region or center if the district does not operate a center. The percentage of

reimbursement is based on the state valuation of the district and the local mill rate expectation. Each region has its own unique cost-sharing agreements with the participating districts. For example, some regions assess districts based on the district's proportion of high school students in the region, regardless of whether the students attend the CTE school, while others base it on the proportion of the CTE students who reside in the district.

MEPRI's Charge

CTE is one of the last educational components to be brought under Essential Programs and Services (EPS), Maine's model for funding public education. In 2005 MEPRI was charged with developing a CTE funding formula that would fit under EPS. The following steps were conducted:

1. Review of cost-studies and funding models in other states
2. Preliminary analysis of expenditures
3. Work with the advisory committee to understand the cost factors, develop a funding model, and make recommendations

Estimating the Cost of CTE

Steven Klein (2001), of MPR Associates published a report in collaboration with the National Association of State Directors of Vocational Technical Education Consortium and the National Conference of State Legislatures, pertaining to the financing of CTE. Klein found that overall the cost of CTE is higher than the cost of regular education. Despite popular belief, the higher cost is not due to higher salaries needed to attract CTE teachers to the field from their trades, rather, it is due to smaller class sizes and the high cost of equipment and supplies to keep programs current with industry standards. The 1993 – 1994 Schools and Staffing Survey found that average base salaries were similar for both CTE and non-CTE teachers. Class sizes,

however, tend to be smaller for CTE courses, particularly in the more technical trade areas where more intensive supervision is necessary. In addition, CTE schools must purchase equipment and supplies to keep their programs current. Funding for such purchases may come from donations or grants and are not reported in the traditional manner.

In February 2001 the Wyoming Supreme Court directed the state to modify its school finance formula to account for the additional cost of CTE programs. Management Analysis and Planning Inc. (MAP) contracted with MPR Associates (2002) to conduct a financial analysis for the state to respond to that charge. The study used existing expenditure data supplemented with data collected from districts specifically for the analysis. They found that the state spent approximately $23 million on CTE in 1999 – 2000 and that 90% of that was for the cost of salaries and benefits for instructors. The researchers concluded, however, that this did not capture the true cost of CTE due to incomplete data. Most districts do not collect detailed information on CTE spending. Among the recommendations in the report was that the state develop an improved method of collecting CTE financial data that would allow for a complete estimation of the additional cost, including the cost of supplies and equipment.

A study of CTE programs conducted in Ohio by the Legislative Office of Education Oversight (2002) came to similar conclusions based on a 1997 study that compared teacher salaries and class sizes in CTE programs to those in regular secondary education. They too found the higher cost of CTE was due to smaller class sizes, but their study showed that this does not apply to all CTE programs. A regression analysis was conducted to determine whether districts that provided CTE programs to larger proportions of their students had higher expenditures. This methodology was necessary because districts do not report CTE expenditures to the state in such a way that they can be isolated from regular education expenditures. The results showed that

only a subset of CTE courses are costly enough to actually impact district spending. Some examples of the courses they found to be high cost are culinary, auto repair, early childhood, and welding and cutting.

CTE Funding in Other States

One of the objectives of Klein's (2001) report was to provide information on how states provide funding for CTE. He outlined four major categories that are used for funding purposes: foundation grants, unit cost funding, weighted funding, and performance funding. The majority of states use a form of unit cost funding to allocate state funds for CTE. Table 2 describes each of the categories and the number of states using each method. Many states use multiple methods for funding; in these cases the method was categorized based on how the majority of funds are distributed.

Table 2. Major Categories Used for Funding Vocational Education

Funding Mechanism	**Description**	**Number of States**
Foundation Grants	States develop an overall threshold level for each student and districts have flexibility of the use of the funds. Voc ed funding is within these funds.	10
Unit Cost Funding	States budget resources specifically for the use of vocational education.	29
Participation	Enrollment is used to determine the size of allocations.	15
Instructional Unit	Uses instructional units (through student/teach ratios) or the total number of students participating divided by average class size.	6
Cost Reimbursement	Reimbursement for all or a percentage of costs	8
Weighted Funding	Assign a higher or add-on weight for students participating in a vocational ed program	10
Performance Funding	Condition all or some of the funding on student participation and/or student outcomes	2

*Source: Klein, Stephen. (2001) Financing Vocational Education: Sorting out the Byzantine world of state funding formulas, district cost variations, and options for supporting the provision of equitable, quality vocational education in high schools. Berkeley, CA: MPR Associates.

In many states, the lack of separate reporting for CTE expenditures limits their ability to estimate the relative cost of CTE and the variation in cost among programs. Maine, however, does collect CTE expenditures separate from regular education, and does require reporting by program. The current method of reporting financial data does have its limitations, however. Some costs are not reported or are not reported at the necessary level. One issue is that the current reporting system does not reflect the use of Perkins funds; they are reported but not delineated by program. Approximately $1.6 million of Perkins funds were invested in secondary

CTE programs in Maine in 2005 – 2006. Secondly, districts are not required to report donations, or revenues that are put directly back into programs. In addition, there is limited visibility of how much is spent on some of the smaller categories such as professional development and co-curricular activities. These are currently lumped together under the same codes.

MEPRI (2006) conducted a preliminary expenditure analysis with the existing expenditure data as an exploratory exercise to examine how much is reportedly being spent on CTE, how that varies across schools, and how it varies across programs. Specifically, we examined the overall per-pupil expenditures by center and region, per-pupil expenditures by program, and the breakdown of expenditures by category. Some key findings from that analysis were:

- There is considerable variance in overall center and region per-pupil expenditures. Per-pupil expenditures in centers range from $2,090 to $65,947 ($6,555 is the maximum when excluding the two smallest centers). Region per-pupil expenditures range from $3,119 to $7,230.
- There does appear to be some relationship between size and per-pupil costs; 31% of the variance in per-pupil expenditure is explained by enrollment.
- The majority of expenses are attributed to particular programs; however, there is a proportion that includes central expenses, not considered to be for any one particular program. This percentage ranges from 6% to 33% with regions tending to fall in the higher end of that range.
- Per-pupil expenditures show great variance, even within the largest programs such as Carpentry ($948 - $15,408) Health Occupations ($573 - $5,730), and Culinary Arts ($1,065 - $5,365).

- The majority of expenses are attributed to staff; however, there is variation among the centers/regions in the percentage of costs that are attributed to supplies and equipment. The programs with the highest percentage of expenses for supplies and equipment are graphic design (23%), multimedia (22%), welding (21%), computer installation and repair (19%), and drafting (17%).

In addition to these findings it was clear that there are four major issues in simply using existing data to develop a model. The four issues are:

1. Apparent wide variation in the cost of similar programs
2. Difficulty matching expenditure and student data
3. Inconsistency in defining programs across the state
4. Equipment expenditures appear to vary within and between schools across years

It was determined that an advisory committee, representing CTE school directors, business managers, superintendents, and DOE staff, would be assembled to meet with MEPRI on a regular basis to provide assistance in the development of the funding model. This would give MEPRI insight into what is not visible in the system of reporting, and provide assistance in the development of data-collection tools used to supplement the existing data. The committee also served as a source of information pertaining to what issues should be taken into consideration during the model development. A list of committee members is included in Table A-2 of the appendix.

Overall Methodology for Model Development

The research for the development of the model has been divided into two phases. Phase one is an examination of the cost drivers with each of the CTE expenditure categories. Due to the fact that reported expenditures are not always the best reflection of the cost of CTE, the analyses

did not simply rely on financial reports but included other sources of data whenever possible. The second phase will entail using the knowledge gained in the first phase for the purposes of developing a funding model. The remainder of this report describes the findings from phase one and provides a preliminary outline of the funding model to be developed in phase two.

Phase One: Analysis of Each Cost Component

CTE costs were divided into six distinct categories for analysis: direct instruction, central administration, operation and maintenance, student and staff support, supplies, and equipment. The largest cost category (56% of expenditures) is direct instruction. Figure 1 displays the proportion of expenditures spent within each category. A series of research questions guided the analyses for each component. These questions and analyses are described in the following six sections. Table 3 includes a description of the data sources used for the analyses within each cost category.

Figure 1. Breakdown of Expenditure Components

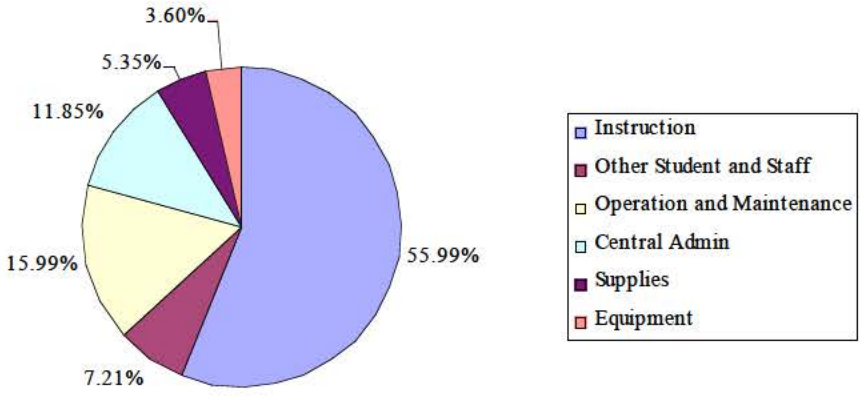


Table 3. Data Sources and Issue by Cost Category

Cost Category	Data Sources	Data Issues
Direct Instruction	DOE staff file	A portion of Perkins funds are used for direct instruction (for example special education ed techs are often partly funded with Perkins funds) but are not reported by program.
	Expenditure data reported by program (EF-M-45)	
	Student count data reported by program (EF-V-116)	
	Surveys of Directors from March 2006	
Operation and Maintenance	Expenditure data (EF-M-45)	There is tremendous variance in how schools are reporting, particularly for schools that are connected to another high school.
	Building square feet	
Central Administration	DOE staff file	
	Expenditure data (EF-M-45)	
Other Student and Staff	DOE staff file	The EF-M-45 does not specify what categories are included in the student-staff support column.
	Expenditure data (EF-M-45)	Professional development may be reported within the program category under purchased professional services but it cannot be separated from other expenditures that may be included in that category
	Perkins budgets	Schools may receive different levels of donations that may fall into this category.
Supplies	Expenditure data reported by program (EF-M-45)	A portion of the Perkins funds are used for supplies but they are not reported by program
	Perkins budgets	Schools may receive different levels of donations that may fall into this category.
Equipment	Expenditure data reported by program (EF-M-45)	Donations
	Perkins budgets	

Direct Instruction

Direct instruction costs include the salaries and benefits for teachers and ed techs that provide direct instruction for CTE programs. The research questions that guided these analyses were:

1 – What are the student-teacher ratios for CTE? Do they vary by program?

2 – What are the average salaries for CTE instructors? How does this vary by experience and education level?

Question 1: What are the student-teacher ratios for CTE? Do they vary by program?

To answer this question MEPRI submitted a survey to CTE directors in the spring of 2006 asking for program capacity, as well as the number of teachers and ed techs in each program. A survey was necessary because the DOE staff file does not collect detail data on the programs that CTE instructors teach. Twenty-one of the 26 directors responded to the survey. The results showed that 86% of programs operate with 32 or fewer students per instructor. This is typically 16 students in the morning session and 16 students in the afternoon session. Table 4 displays the number of students per teacher by program category. The description of each program grouping is included in Table A-3 of the appendix.

Table 4. Students per Teacher (Capacity) by Program Group

Program Group	Students per Teacher		20 - 32 Students per Teacher		Students per Teacher		Total
	n	%	n	%	n	%	
Agriculture	3	33.33%	5	55.56%	1	11.11%	9
Forestry	2	40.00%	3	60.00%	0	0.00%	5
Commun	3	16.67%	14	77.78%	1	5.56%	18
Culinary	1	5.88%	12	70.59%	4	23.53%	17
Comp	1	6.67%	12	80.00%	2	13.33%	15
Drafting	1	11.11%	7	77.78%	1	11.11%	9
Child Care	1	7.69%	10	76.92%	2	15.38%	13
Building Trades	6	20.69%	19	65.52%	4	13.79%	29
Auto Trades	5	13.16%	31	81.58%	2	5.26%	38
Welding	0	0.00%	19	95.00%	1	5.00%	20
Health Occupations	4	21.05%	13	68.42%	2	10.53%	19
Business	5	23.81%	9	42.86%	7	33.33%	21
Protective Servies	1	11.11%	5	55.56%	3	33.33%	9
Other	17	45.95%	14	37.84%	6	16.22%	37
Total	50	19.31%	173	66.80%	36	13.90%	259

In addition, MEPRI examined the use of ed techs. The majority of schools did not specify that they used ed techs for individual programs, with the exception of special needs and forestry programs**.** Four of the five forestry programs and seven of the ten special needs programs utilize ed techs.

Question 2: What are the average salaries for CTE instructors? How does this vary by experience and education level?

In 2005 – 2006 the average salary for a CTE instructor was $42,139 and the average years of experience of CTE instructors was 12.9. Approximately 43% of the teachers had less than bachelor's degrees, 43% had bachelor's degrees, and 14% had master's degrees. The base salary for an instructor with no experience and less than a bachelor's degree was $34,299. Table 5 displays these data.

Table 5. Average Salaries by Educational Attainment and Teaching Experience

	Less than Bachelor's		Bachelor's		Master's	
Experience Level	Teachers	Average Salary	Teachers	Average Salary	Teachers	Average Salary
No Experience	13	$34,299	7	$30,837	3	$33,589
1 - 5 years	41	$35,075	24	$35,375	3	$38,198
6 - 10 years	27	$36,475	34	$41,904	4	$45,164
11 - 15 years	22	$40,228	22	$43,497	9	$45,135
16 - 20 years	27	$43,862	20	$46,477	6	$45,645
21 - 25 years	8	$44,300	18	$48,534	5	$52,758
26 - 30 years	7	$47,357	11	$47,079	7	$56,867
31+ years	2	$50,879	11	$50,725	11	$56,587

Schools may hire a teacher with more years of relevant work experience at a higher salary than a teacher with fewer years of work experience, regardless of teaching experience or educational attainment. The advisory committee therefore recommended that MEPRI consider relevant work experience and the impact that has on salaries. MEPRI conducted a survey of CTE directors in the summer of 2006 to identify the factors that schools consider in their base salary calculations. Surveys were returned for 22 schools. The results showed that the majority of schools (15 of the 22 respondents) do consider work experience in their base salaries. Ten of the fifteen indicated they rewarded 1 step for every 2 years of relevant work experience.

Central Administration

Central administrative costs include the salaries and benefits for directors, assistant directors, central office support, and business managers. Other costs related to the school administrative office, such as office supplies, are also included. The research questions that guided these analyses were:

1 – Is there a relationship between enrollment and total or per-pupil central administrative expenses?

2 – What staff members do CTE schools employ in the administrative capacity? Does this differ for regions and centers and/or schools of different sizes?

3 – What proportion of central admin costs are salaries/benefits versus other costs?

Only schools that had more than 10 students reportedly enrolled in CTE for each of the last three years were included in these analyses; this excluded two schools.

Question 1: Is there a relationship between enrollment and per-pupil central administrative expenses?

As would be expected, there is a relationship between enrollment and three-year average total central administrative expenses. Larger schools spend more than smaller schools in this area. Figure 2 shows this relationship. On a per-pupil basis, however, there is an indication that larger schools spend less than smaller schools. Approximately 22% of the variance in the per-pupil expenses may be associated with school size. Figure 3 displays this relationship.

Figure 2. Relationship Between Enrollment and Total Central Admin Expenses

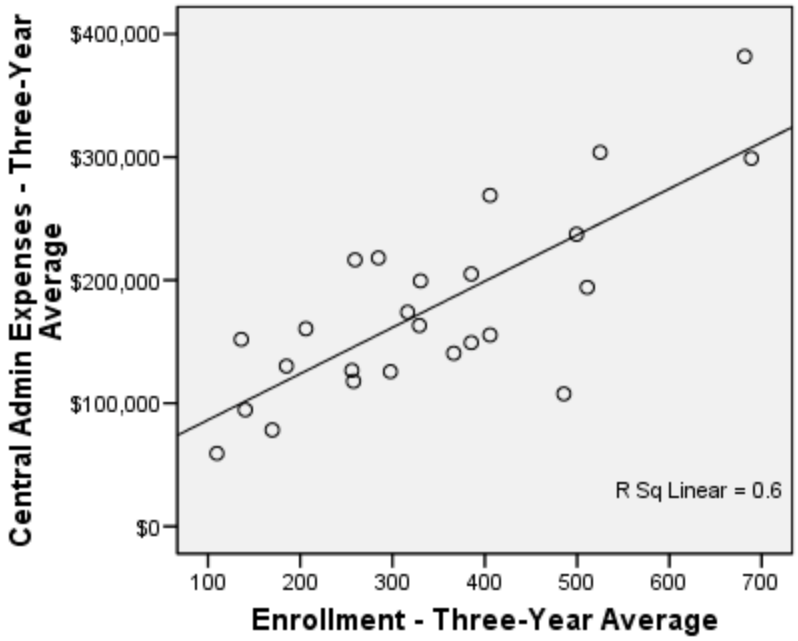
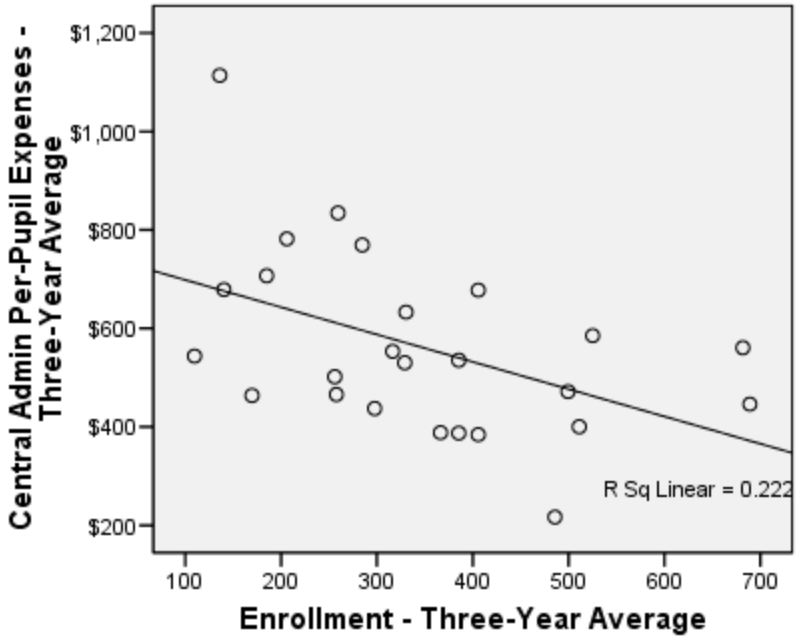


Figure 3. Relationship Between Enrollment and Per-Pupil Central Admin Expenses



Question 2: What staff members do CTE schools employ in the administrative capacity? Does this differ for regions and centers and/or schools of different sizes?

All schools employ a CTE director and larger schools also employ an assistant director (five of the seven schools with an assistant director had approximately 350 or more students). The majority of the regions employ someone in the business/manager position; since centers are within school districts they utilize the district business managers and typically pay an allocated amount for that service. All schools employ clerical staff and the student-clerical ratios range from 66 to 446. Table 6 displays the FTEs employed within each school by position in 2005 – 2006.

Table 6. Staff FTEs by Category and School

School		Unduplicated Student Count	Director	Assistant Director	Business Manager/ Bookkeeper	Clerical	Students Per Clerical Position
Centers	School M	651	1	1	0	2	357
	School R	597	0.5	1	0	2.5	250
	School J	519	1	1	0	1.5	277
	School U	443	1	0	0	2	185
	School D	382	1	0	0	2.7	142
	School A	375	1	0	1	1	391
	School Z	366	1	1	0	2	297
	School Y	323	1	0	0	2	186
	School C	307	1	0	0	1	232
	School S	261	1	0	0	1	249
	School G	239	1	0	0	2	173
	School V	216	1	0	0	1	275
	School H	209	1	0	0	1.4	149
	School P	173	1	0	0	1	192
	School F	143	0.8	0	0	0.8	225
	School K	123	1	0	0	1	135
	School I	113	N/A*	0	0	2.7	
Regions	School Q	571	1	0	2	1	446
	School B	465	1	1	0	3	179
	School T	347	1	1	0	1	415
	School X	280	1	1	1	1	274
	School L	238	1	0	0.3	1.8	206
	School E	235	1	1	1	1.1	321
	School N	234	1	0	1	1	271
	School O	146	0.5	0	0.8	2	66

* This school is in between permanent directors.

Question 3: What proportion of central admin costs are salaries/benefits?

Overall 84% of the central administrative expenses are spent on salaries and benefits. The percent that was spent on other expenses in 2005 – 2006 ranged from 0% to 65%. More than half (53%) of the other expenses were designated as insurance or supply costs. Table 6 displays the 2005 – 2006 central admin expenses by school.

Table 6. Central Administrative Expenses by School

School		Salary/Benefits		Other Expenses		Total
		Amount	%	Amount	%	
Centers	School M	$303,466	89%	$37,879	11%	$341,346
	School R	$224,107	76%	$72,722	24%	$296,829
	School J	$127,256	95%	$6,895	5%	$134,151
	School U	$164,635	95%	$8,123	5%	$172,758
	School D	$137,143	93%	$10,293	7%	$147,436
	School A	$212,641	66%	$110,684	34%	$323,326
	School Z	$160,800	81%	$37,831	19%	$198,631
	School Y	$134,682	92%	$11,837	8%	$146,518
	School C	$114,602	86%	$18,255	14%	$132,857
	School S	$46,906	35%	$87,169	65%	$134,076
	School G	$132,060	95%	$6,994	5%	$139,055
	School V	$111,336	90%	$11,766	10%	$123,102
	School H	$101,475	79%	$26,340	21%	$127,815
	School P	$128,586	92%	$10,666	8%	$139,252
	School F	$57,608	85%	$10,425	15%	$68,033
	School K	$77,049	89%	$9,243	11%	$86,292
	School I	$48,664	100%	$0	0%	$48,664
Regions	School Q	$287,041	94%	$16,709	6%	$303,750
	School B	$295,335	92%	$26,055	8%	$321,390
	School T	$173,562	86%	$27,647	14%	$201,208
	School X	$207,281	91%	$19,265	9%	$226,546
	School L	$122,406	62%	$74,205	38%	$196,611
	School E	$128,965	72%	$49,149	28%	$178,113
	School N	$160,692	83%	$31,968	17%	$192,659
	School O	$150,914	87%	$22,683	13%	$173,597
Total		$3,809,209	84%	$744,804	16%	$4,554,013

Supplies

Supplies include the cost of supplies for CTE programs. Supplies are typically items that may be consumed, worn out, or deteriorated through use. The research questions guiding these analyses were:

1 – How do the expenditures for supplies differ for different types of programs?

2 – What is the relationship between program type, the number of students, and supply expenses?

Question 1: How do the expenditures for supplies differ for different types of programs?

MEPRI examined the three-year average supply expenditures by program category. The program categories are defined in Table A-3 of the appendix. The two programs with the highest supply expenditures are welding and culinary arts. Childcare, protective services, and health occupations appear to be less costly in respect to supply costs. Table 7 displays the total supply expenditures per program category.

Table 7. Three-Year Average Total Supply Expenditures by Program Category

Program Category	Number of Programs	Mean Total Supply Expenditures
Welding	14	$10,130
Culinary	21	$9,903
Auto Tech	48	$7,043
Building Trades	39	$6,683
Communications	23	$6,651
Computer Repair	19	$5,578
Drafting	13	$5,018
Agriculture	10	$4,552
Business	27	$4,533
Forestry	5	$4,484
Other	63	$3,973
Childcare	15	$3,567
Protective Services	11	$3,221
Health Occs	27	$3,129

Question 2: What is the relationship between program type, the number of students, and supply expenses?

A reasonable hypothesis is that the amount spent on supplies is a function of program size and type. An analysis of supplies showed that there is a statistically significant, but weak relationship between supply expenditures and program size; this is shown in Figure 4 below. The advisory committee asked MEPRI to examine both the fixed and variable aspects of supply costs. In other words, they wanted to consider both the variance in costs due to the program alone and the potential incremental cost associated with each additional student enrolled. To examine this, MEPRI used multiple regression to predict total program expenditures from number of students and program category indicators. The programs with significantly higher total supply expenses were: culinary, auto tech, welding, building trades, communications, and

computer tech. Student enrollment was also a significant predictor, indicating an increase of $49 in total supply costs for each student enrolled. Table 8 displays the coefficients from the regression model. The detailed results appear in Table A-4 in the appendix.

Figure 4. Relationship Between Enrollment and Total Supply Expenditures

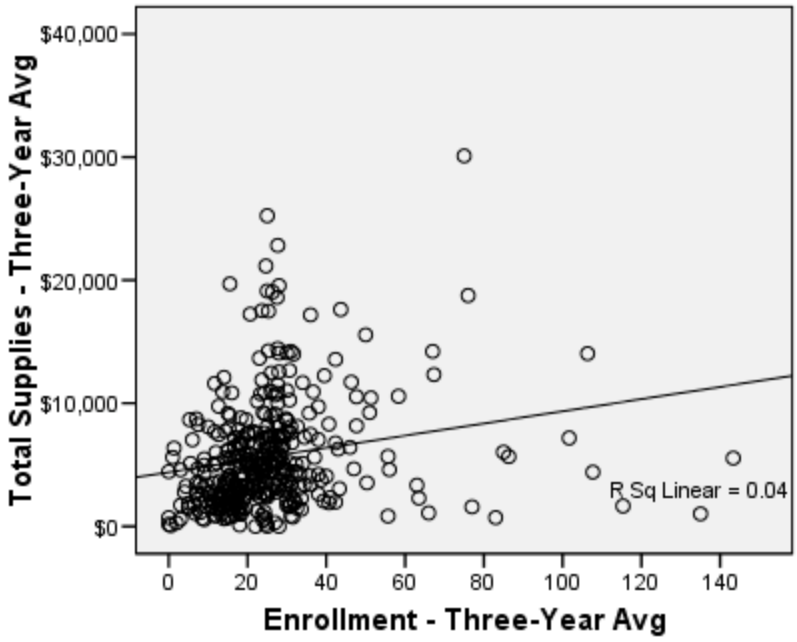


Table 8. Supply Cost Estimates

	Supply Cost Estimate
Culinary	$8,606
Auto-Tech	$5,515
Welding	$8,956
Building Trades	$5,447
Communications	$5,484
Computer	$4,496
All Other	$2,717
Incremental cost per student	$49

Operation and Maintenance

Operation and maintenance include such costs as salaries and benefits for custodial staff, cleaning and maintenance supplies, and utilities, etc.. The research questions guiding the analyses of operation and maintenance expenditures were:

1 – What is the relationship between number of students, square feet, and expenditures? Which is the better predictor of expenditures?

2 – What other sources of data may be available for comparative purposes?

Question 1: What is the relationship between number of students, square feet, and expenditures? Which is the better predictor of expenditures?

An analysis of reported operation and maintenance expenditures revealed that expenditures for operations and maintenance were more strongly related to the square footage of the school than the number of students enrolled. Figures 5 and 6 display these relationships. Only 23 schools were included in this analysis. Two schools did not report expenditures, one school included additional expenditures that others did not, and a fourth school was an outlier in terms of square footage and cost.

Figure 5. Relationship Between Enrollment and Expenditures

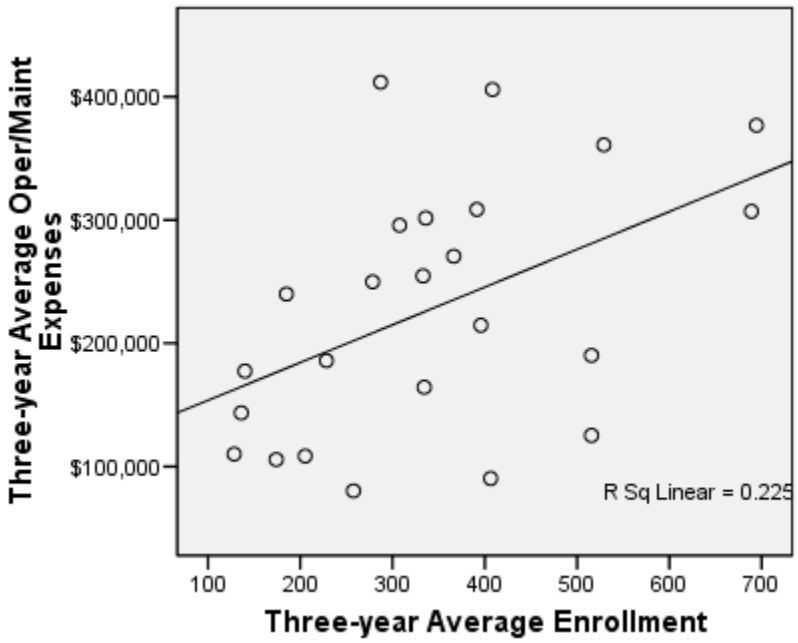
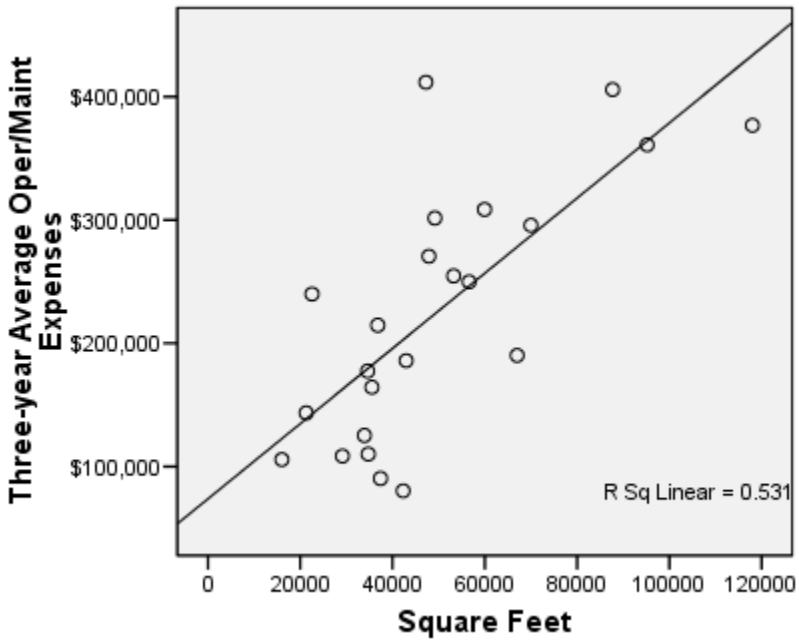


Figure 6. Relationship Between Square Feet and Expenditures



Question 2: What other sources of data may be available for comparative purposes?

The advisory committee expressed concern that the average reported expenditures per square foot ($5.24 in 2005 - 2006) was low and asked MEPRI to look for a national source of data. To validate this number MEPRI looked at a series of studies conducted by American School and University (AS&U) in 2006 and 2007, a periodical that focuses on school facilities. They conduct annual surveys of business managers at school districts and colleges to retrieve expenditure data per student and square foot for operation and maintenance. For the purpose of this analysis we concentrated on expenditures per square foot since that appeared to be the driving cost factor in our analyses. The results show that the expenditures per square foot for Maine CTE schools is reasonably close to what is spent nationally for two-year colleges. It would be expected, given the nature of CTE programs, that their expenses in this category may more closely resemble what is spent in two-year colleges. These results appear in Table 9.

Table 9. Results from AS&U Maintenance and Operations Cost Studies

	2006 - 2007		2005 - 2006			
	School Districts	Colleges	School Districts	2-year colleges	4-year colleges	Total college
Payroll	2.56	2.32	2.08	2.38	2.00	2.18
Outside Contract Labor	0.01	0	0.17			
Utilities	1.71	1.9	1.31	1.78	1.77	1.78
Equipment and Supplies	0.32	0.42	0.33	0.32	0.35	0.35
Other	0.49	0.52	0.2	1.01	0.47	0.85
Total Expenditure Per Square Foot	5.09	5.16	4.09	5.49	4.59	5.16

In addition, AS&U calculates the number of square feet maintained per custodian. The number of square feet maintained per full-time custodial in two-year colleges in 2005 – 2006 was 35,326. The average number of square feet maintained per full-time custodian in CTE schools in Maine is 28,988.

Student and Staff Support Costs

Student and staff support costs include such costs as student service personnel/guidance counselors, technical coordinators, professional development, co-curricular activities, and school-wide safety costs, etc…There is little visibility of such expenses in the current financial system. In addition there is tremendous variance in how schools handle the various aspects of student and staff support. The research questions guiding these analyses were:

1 – How much is spent per-pupil on student and staff support? Are there differences between regions and centers?

2 – Is there a relationship between enrollment and total or per-pupil student and staff support expenses?

3 – What categories of support staff do schools employ?

4 – How much do schools spend on professional development and co-curricular activites?

Question 1: How much is spent per-pupil on student and staff support? Are there differences between regions and centers?

The overall three-year average per-pupil amount for student and staff support expenditures is $304. There is a statistically significant difference in the per-pupil expenditures reported at centers and regions ($p < .05$). The average per-pupil expenditure in regions was $457, compared to $240 in centers.

Question 2: Is there a relationship between enrollment and total or per-pupil student and staff support expenses?

Only 25 schools were used for these analyses; the two schools with fewer than 10 students were excluded. There is a very weak relationship between enrollment and total expenditures and no relationship between enrollment and per-pupil expenditures. These relationships are shown in Figures 7 and 8.

Figure 7. Relationship Between Enrollment and Total Student/Staff Support Expenditures

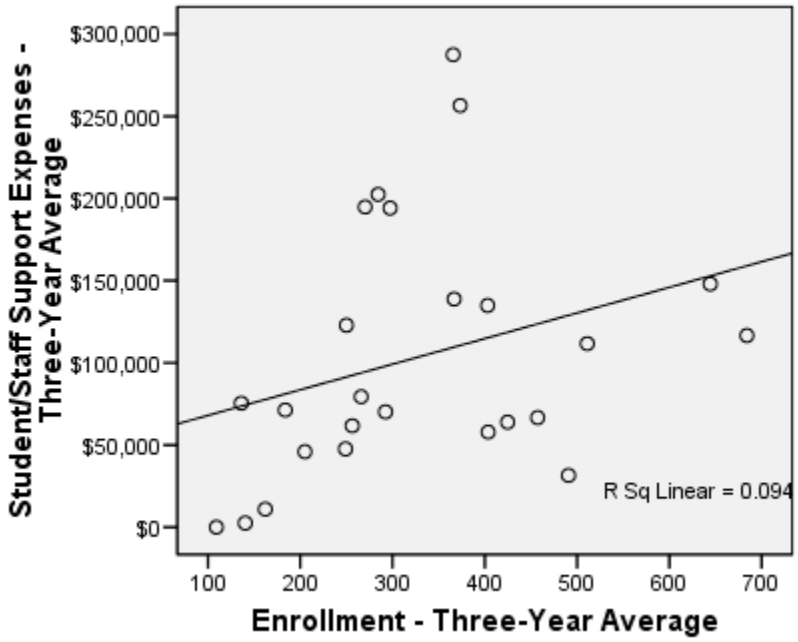
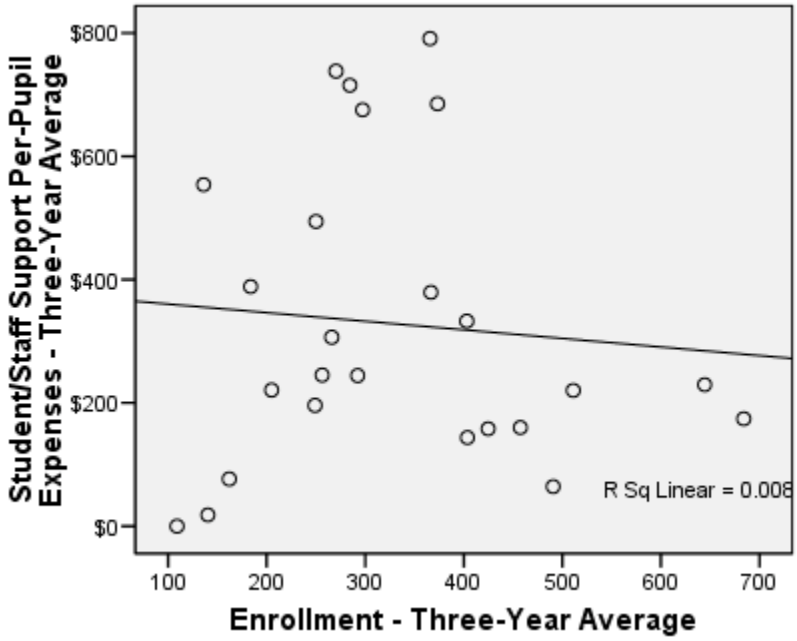


Figure 8. Relationship Between Enrollment and Per-Pupil Student/Staff Support Expenditures



Question 3: What categories of support staff do schools employ?

MEPRI used the 2005 – 2006 staff file to examine the types of positions that schools employ within this general category. The most popular positions are co-curricular (typically partial time stipends) and guidance counselors. Eight schools employ guidance counselors but discussions with the advisory committee suggested that in some schools this function was performed by the assistant director or someone with a different position code. Table 10 displays these data.

Table 10. Student/Staff Support FTEs by Position and School

School		Co-Curricular	Guidance Counselor/ Student Services	Computer Tech/Maintenance	Nurse/Health Services	Other*
Centers	School M	0.0	**1.0**	0.0	0.0	**1.8**
	School R	0.0	**1.0**	0.0	0.0	**2.2**
	School J	**0.4**	0.0	0.0	0.0	0.0
	School U	0.0	**1.0**	0.0	0.0	**1.0**
	School D	**2.1**	**1.0**	0.0	**1.0**	**1.0**
	School A	**0.2**	0.0	0.0	0.0	**0.4**
	School Z	**0.1**	0.0	0.0	0.0	**0.2**
	School Y	**0.3**	**0.9**	0.0	0.0	1.0
	School C	**0.2**	0.0	0.0	0.0	0.0
	School S	**0.3**	0.0	0.0	0.0	0.0
	School G	**0.7**	**1.0**	0.0	0.0	0.0
	School V	0.0	**1.0**	0.0	0.0	0.0
	School H	**0.2**	0.0	0.0	0.0	**1.0**
	School P	0.0	0.0	0.0	0.0	0.0
	School F	0.0	0.0	0.0	0.0	1.0
	School K	**0.6**	0.0	0.0	0.0	0.0
	School I	0.0	0.0	0.0	0.0	0.0
Regions	School Q	0.0	0.0	0.0	0.0	0.0
	School B	0.0	0.0	**1.0**	0.0	**1.0**
	School T	0.0	0.0	**1.0**	0.0	0.0
	School X	0.0	0.0	**0.7**	0.0	0.0
	School L	0.0	0.0	0.0	0.0	**1.0**
	School E	0.0	0.0	0.0	0.0	**1.0**
	School N	0.0	**1.0**	0.0	0.0	0.0
	School O	0.0	0.0	**0.3**	**1.0**	0.0

*Other - Special Ed Consultant, Attendance Coordinator, Voc Ed Evaluator, Department Head, volunteer coordinator, social worker, student activities director

Question 4: How much do schools spend on professional development and co-curricular activites?

In the summer of 2006 MEPRI sent all CTE directors a survey regarding their expenditures in the areas of professional development and co-curricular activities. Responses were received from 16 schools. The results showed that the majority of the professional

development costs are for conferences, workshops, or university work, and co-curricular funds are predominantly spent on Skills USA. We examined what is spent per-teacher for professional development and per-student for co-curricular activities and the variance across schools was quite staggering. Professional development expenses per teacher range from less than $200 to approximately $2600. Co-curricular also vary greatly, from just $3 per student to $56 per student. These data appear in Table 11.

Table 11. Reported Professional Development and Co-Curricular Expenses

Responding School	Professional Development Per Instructor	Co-Curricular Per Student
School A	$2,662	$56
School B	$2,644	$26
School C	$1,934	$28
School D	$1,795	$40
School E	$1,451	$42
School F	$1,377	$19
School G	$1,267	
School H	$1,253	$54
School I	$1,191	$3
School J	$1,125	$55
School K	$1,019	$23
School L	$1,014	$28
School M	$776	$20
School N	$618	
School O	$592	$60
School P	$144	

by School

Advisory Committee Input

The data clearly show that simply understanding what is included in this area is complicated; quantifying a reasonable amount that should be spent is just not possible using the current expenditure data. Schools function in such different ways that simply using the existing data may not be sufficient to provide accurate funds in this category. MEPRI therefore turned to

the advisory committee for recommendations regarding the resources that should be included in this category. This resulted in a recommendation that the staffing categories should include student service personnel/guidance counselors, technology coordinators, and safety specialists. In addition funds are necessary to continue the co-curricular activities and professional development.

Equipment Costs

A preliminary analysis of equipment expenditures showed tremendous variance in the amount spent on equipment across schools. Capital equipment generally includes large-scale equipment, usually items that cost at least $500. Items in this category typically serve their purpose for over a year and are repairable. The research questions that guided these analyses were:

1 - Is there a relationship between the number of students or types of programs and equipment expenditures?

2 - Is there a variation in how much schools spend on equipment each year?

Question 1: Is there a relationship between the number of students or types of programs and equipment expenditures?

There is not a significant linear relationship between the number of students in a program and the program equipment expenditures. Figure 9 shows the relationship between number of students and 2005 – 2006 equipment expenditures. There are differences in expenditures across program categories but the range of expenditures within programs is quite wide and there are significant fluctuations from year to year. Table 12 displays the minimum, mean, and maximum values by program across years.

Figure 9. Relationship Between Program Size and Equipment Expenditures

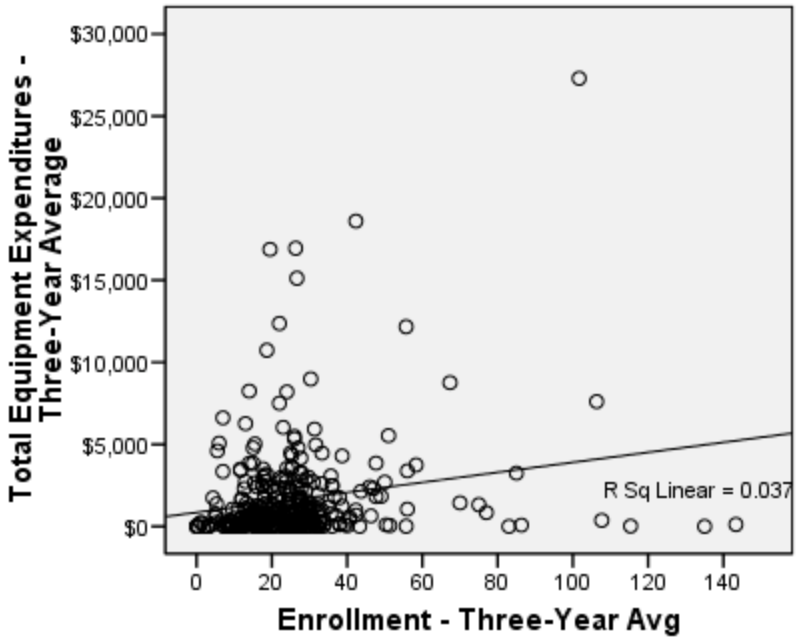


Table 12. Equipment Expenditures by Program Category

	2003 - 2004			2004 - 2005			2005 - 2006		
	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum
Agriculture	$0	$699	$2,037	$0	$3,281	$24,795	$0	$20,721	$158,430
Forestry	$0	$803	$3,100	$0	$1,064	$3,054	$0	$1,993	$7,325
Communications	$0	$7,718	$54,000	$0	$5,924	$25,949	$0	$6,261	$45,800
Culinary	$0	$1,645	$6,150	$0	$3,753	$18,617	$0	$1,989	$10,708
Computer Repair	$0	$7,170	$42,500	$0	$5,111	$34,177	$0	$4,420	$15,073
Drafting	$0	$5,060	$22,856	$0	$4,965	$40,800	$0	$5,565	$28,539
Childcare	$0	$1,253	$10,244	$0	$1,677	$5,975	$0	$1,257	$7,230
Building Trades	$0	$2,045	$24,500	$0	$2,091	$12,849	$0	$2,216	$13,592
Auto Tech	$0	$1,710	$12,700	$0	$3,231	$28,621	$0	$5,213	$35,909
Welding	$0	$4,381	$20,625	$0	$2,659	$24,147	$0	$6,979	$52,704
Health Occupations	$0	$1,362	$12,765	$0	$1,227	$5,994	$0	$872	$5,510
Business	$0	$2,562	$20,264	$0	$3,572	$26,962	$0	$2,715	$25,000
Protective Services	$0	$497	$1,801	$0	$1,787	$13,553	$0	$2,328	$15,000
Other	$0	$3,132	$44,454	$0	$2,448	$54,701	$0	$1,060	$6,651

Question 2: Is there a variation in how much schools spend on equipment each year?

MEPRI examined the total spent on equipment by school for the last three years. There are not clear patterns that can be detected from the data. One school (School U) was responsible for more than 10% of the statewide expenditures in all three years, though they only represent 4% of the programs. Some schools reported consistent levels of expenditures across years (such as Schools M or J) while others show dramatic fluctuations (such as Schools X or G). Table 13 shows the total equipment expenditures by school and year.

Table 13. Equipment Expenditures by School and Year

School	Number of programs (05 - 06)	% of Programs	2003 - 2004 Total Equipment Expenditures	2003 - 2004 %	2004 - 2005 Total Equipment Expenditures	2004 - 2005 %	2005 - 2006 Total Equipment Expenditures	2005 - 2006 %
School S	7	2%	$40,487	3%	$58,361	4%	$233,567	15%
School U	13	4%	$210,413	17%	$198,806	15%	$181,928	12%
School Z	14	4%	$127,018	10%	$141,878	10%	$119,093	8%
School R	21	6%	$68,054	5%	$92,309	7%	$118,560	8%
School L	9	3%	$8,748	1%	$35,131	3%	$95,371	6%
School Y	15	5%	$98,197	8%	$60,389	4%	$59,890	4%
School I	8	2%	$41,915	3%	$75,415	6%	$70,830	4%
School A	19	6%	$94,867	8%	$100,868	7%	$120,194	8%
School E	15	5%	$13,834	1%	$32,705	2%	$42,287	3%
School B	16	5%	$80,754	7%	$55,841	4%	$76,883	5%
School M	21	6%	$39,003	3%	$40,561	3%	$43,242	3%
School D	12	4%	$23,964	2%	$30,410	2%	$35,119	2%
School N	16	5%	$24,531	2%	$19,356	1%	$34,591	2%
School T	17	5%	$45,303	4%	$30,564	2%	$60,298	4%
School O	8	2%	$16,116	1%	$21,408	2%	$47,451	3%
School P	8	2%	$45,681	4%	$42,276	3%	$21,681	1%
School V	9	3%	$35,377	3%	$38,650	3%	$30,868	2%
School Q	18	6%	$39,748	3%	$56,108	4%	$45,548	3%
School X	16	5%	$11,503	1%	$38,313	3%	$28,782	2%
School F	8	2%	$10,369	1%	$16,872	1%	$19,222	1%
School C	9	3%	$44,615	4%	$41,715	3%	$18,573	1%
School G	14	4%	$16,106	1%	$26,777	2%	$7,041	0%
School H	9	3%	$73,798	6%	$61,514	5%	$30,400	2%
School J	12	4%	$26,983	2%	$29,565	2%	$35,985	2%
School K	8	2%	$4,943	0%	$8,274	1%	$0	0%

Advisory Committee Input

The advisory committee expressed concern about developing an allocation method for this category. This is an area where costs are often unpredictable as was indicated in the year-to-year fluctuations that appeared in the data. Replacement cycle variations and the unpredictability of donations are two factors that contribute to this variability. To make matters more complicated, changes in how schools can use their Perkins funds may impact how much of their Perkins allocation may be spent in this area. In addition, the ever evolving technology in CTE programs requires changes in equipment, and all schools have not been able to bring their

programs up to industry standards. Some schools may have further to go in bringing their programs up to date than others. Given these considerations, it was determined that this category may be a category that may continue to be funded using a form of percentage reimbursement.

Phase Two: The Development of a Model

MEPRI is continuing to conduct research pertaining to the development of a model and has moved on to the second phase of the process. The methodology for this phase will include the development of scenarios for calculating potential allocations followed by comparisons of potential allocations to actual expenditures. The resulting funding model will be one that fits as many schools as possible. This work is still being conducted and will be reported on after completion with the recommendation for the final funding model. At this point MEPRI can provide the general structure for what will be reflected in the model. This appears in Table 14.

Table 14. Considerations to be Included in the Model

Component	Allocation to Reflect
Direct Instruction	Teacher FTEs Based on Enrollment Ranges
	Ed techs for Forestry and Special Needs Programs
	Floating ed techs
	CTE-Specific Salary Matrix
Central Admin	Directors, assistant directors, business managers, and clerical staff
	Other central admin costs (leases, office supplies)
Operation and Maintenance	Cost per square foot
Student and Staff Support	Guidance counselor/Student services personnel, technology coordinators, safety specialists
	Professional development, co-curricular activities
Supplies	Differences among program categories
	Number of students per program
Equipment	TBD

As this phase continues some specific analyses that still remain to be conducted are:

1. Examination of the impact that building age has on the cost of operation and maintenance.

2. Identify possible inflationary factors that may be used for those costs that may not fit under CPI, such as supplies. CTE supplies are very different from supplies in regular education and may need a separate inflationary factor built into the model.

3. Construct a CTE-specific salary matrix that includes educational attainment, teaching experience, and relevant work experience.

The work of MEPRI and the advisory committee will continue through the fall of 2007. At the completion of the work it is expected that a recommendation for a funding model for CTE will be made to the Maine Department of Education.

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Appendix

Table A-1. CTE Program Offerings

CIP Code	Program Description	Number of Programs
99.1000	Cooperative Education	33
46.0201	Carpentry	26
47.0604	Automotive Mechanic/Technician	26
51.0000	Health Services/Allied Health/Health Sciences	22
12.0503	Culinary Arts/Chef Training	21
19.0709	Child Care Services / Workers and Managers	16
47.0104	Computer Installer and Repairer	16
48.0508	Welder / Welding Technologist	13
47.0603	Automotive Body Repair	11
48.0501	Machinist / Machine Technologist	11
99.7000	Vocational Special Needs	11
99.4000	Tech Prep Academics	10
15.1301	Architectural Drafting	9
43.0107	Law Enforcement / Police Sciences	8
46.0302	Electrician	8
1.0601	Horticulture Operation and Management	7
52.0407	General Office/Clerical/Typing Services	7
50.0602	Film, Video Making / Cinematography and Production	6
52.0401	Administrative Assistant / Secretarial	6
52.1803	General Retailing Operations	6
3.0511	Forest Harvest and Product Technology	5
10.0202	Radio and TV Broadcast Technology	5
10.0305	Graphic / Printing Equipment Operator, General	5
32.0105	Job Seeking / Job Changing Skills	5
47.0302	Heavy Equipment Maintenance and Repair	5
49.0205	Truck / Bus / Other Commercial Vehicle Driver	5
50.0402	Graphic Design / Commercial Art and Illustration	5
43.0000	Protective Services Cluster	4
47.0606	Small Engine Mechanic / Repairer	4
51.1614	Nursing Assistant/Aide	4
32.0107	Career Exploration / Awareness Skills	3
46.0503	Plumbing and Pipefitting	3
47.0616	Marine Maintenance / Fitter and Ship Repairer	3
52.0201	Business Administration and Management/General	3
99.3001	Tech Lab	3
10.0303	Desktop Publishing Equipment	2

41.0101	Biological Technologies / Technicians	2
52.0302	Accounting Technician	2
52.0803	Banking and Financial Support Services	2
1.0000	Agriculture / Agribusiness	1
1.0205	Agriculture Mechanization, General	1
1.0303	Aquaculture	1
1.0304	Crop Production Operations and Management	1
3.0201	Natural Resource Management	1
10.0301	Graphic Communications, General	1
11.0103	Computer and Information Sciences, General	1
11.0801	Data Processing Technology / Technician	1
12.0505	Food Preparation/Professional Cooking/Kitchen Assistant	1
15.0000	Engineering Technology / Technician, General	1
15.0613	Tech Lab	1
15.1302	CAD/CADD Drafting and/or Design Technology/Technician	1
15.1303	Mechanical Drafting	1
31.0301	Parks and Recreational Facilities Management	1
46.0000	Construction Trades, General	1
46.0101	Mason and Tile Setter	1
47.0101	Electrical / Electronics Equipment Repair, General	1
48.0506	Sheet Metal Worker	1
49.0202	Construction Equipment Operator	1
50.0101	Visual and Performing Arts, General	1
50.0409	Digital Graphic Arts Desktop Publishing Equipment Operator	1
51.0703	Health Unit Coordinator / Ward Clerk	1
51.0710	Medical Office Assistant/Specialist	1
51.2602	Elder Care Provider / Companion Care	1
52.0399	Accounting, Other	1
52.0408	General Office / Clerical / Typing Services	1
52.0701	Entrepreneurship/Entrepreneurial Studies	1
52.1801	Sales, Distribution, and Marketing Operations, General	1
52.1910	Hospitality / Recreational Marketing, General	1

Table A-2. Members of the CTE/EPS Advisory Committee

Name	Affiliation	Position
Joanne Allen	DOE	School finance consultant
Bill Braun	MSAD 48	Superintendent
Yvonne Davis	Independent	
Alan Dickey	Region 3	CTE Director
Phil Dionne	State Board of Education	Vice Chair
Lora Downing	DOE	CTE coordinator
Todd Fields	Westbrook	CTE Director
Trish Hayes	Region 4	Business manager
Mike Howard	Region 2	CTE Director
Greg Miller	Region 4	CTE Director
Scott Phair	Augusta	CTE Director
Mark Powers	Waterville	CTE Director
Joseph Vallancourt	Region 11	Business manager

Table A-3. Program Categories Used in Supply Analysis

Program Category	Programs
Agriculture	Agriculture, agriculture mechanization, agriculture business, crop production, horticulture, natural resource management
Forestry	Forestry
Communciations	Radio broadcasting, graphic communications, desktop publishing, graphic/printing equipment, graphic design, digital graphic arts, film/video making
Culinary	Culinary arts, food preparation
Computer tech	Computer information sciences, computer technician, computer installer
Drafting/engineering	Engineering tech, manufacturing tech, drafting, architectural drafting, mechanical drafting
Child care	Child care
Building trades	Construction trades, carpentry, electrician, plumbing, electronical equip repair, construction equipment operator
Auto trades	Heavy equipment maintenance, auto body repair, auto tech
Welding	Welding
Health Occupations	Health occupations, nursing assistant, elder care provider
Protective services	Protective services, law enforcement

Table A-4. Regression Results from Supply Analysis

	b	**s.e.**	**_**	***t***	***p***
(constant)	2716.87	432.58		6.28	0.00
Culinary	5889.10	914.30	0.32	6.44	0.00
Welding	6239.31	1098.58	0.28	5.68	0.00
Auto-tech	2798.08	653.00	0.22	4.29	0.00
Building Trades	2729.60	702.81	0.20	3.88	0.00
Communications	2767.00	878.65	0.16	3.15	0.00
Computer tech	1779.99	833.17	0.11	2.14	0.03
Enrollment	48.86	11.72	0.20	4.17	0.00
R-squared = .23					

Locations of CTE Centers and Regions