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A Study of the Cost of Instruction of the Various High School Subjects in Maine

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A STUDY
of the
COST OF INSTRUCTION
OF THE VARIOUS
HIGH SCHOOL SUBJECTS
IN MAINE

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF

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BIBLIOGRAPHY

Munroe The Cost of Instruction in Kansas High Schools

Babbitt High School Costs

Rugg Statistical Methods Applied to Education

University of Chicago Survey of South Bend, Indiana Schools

Maine School Report, 1916

Josselyn The High School as a Business Enterprise

Spaulding Report of Schools of Newton, Mass.-1911-1912

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High School education is becoming not a luxury but a necessity, and the High School to meet the varying needs of the individual pupils is offering more and more differentiated work. Never in the world has any nation been so willing to tax itself for educational purposes as our country at the present time. We have now in High School in the United States over a million and a quarter pupils and this vast number is constantly increasing. The material equipment for this great enterprise is worth approximately one billion of dollars, and the yearly budget amounts to over $4,000,000. In the year 1916, the State of Maine expended for instruction alone in its high schools and academies $682,924, employing 1037 men and women to carry on the work, and giving instruction to 20,063 pupils.

The efficiency with which this management of the high school is carried on is far below that demanded for private business. Men are unwilling to invest such large sums of money without knowing very definitely whether their business is paying or not and in what departments lies success or failure. The owner of a large factory knows to a nicety whether his money invested is bringing adequate returns, or if there is a deficit he is able by standards which he has raised through the different years to place his finger upon

the unsatisfactory department , whether it be labor, repairs or what not, and find the cause and apply the remedy. If we are to run our schools as such great enterprises, business principles must be applied and results must be evaluated. The business man has made his concern more efficient by collecting facts concerning the various costs and the value of the finished product and by using these as a basis for the further administration of his business. If our secondary schools are to be efficiently managed, the same principles must be applied--mere personal opinion is not a reliable standard.

Comparatively few attemps have been made in the educational world to establish standard for the various costs in High School. More has been attempted in the costs of supervision, janitor service, salaries as a whole, and entire cost of instruction than in the cost of instruction of the various High School subjects for the individual pupil.

Superintendent Spaulding of Newton, Massachusetts, who has made studies given in the School report of that city showing graphically the purchasing value of a dollar in the class instruction of various subjects says: "I greatly doubt that we educational administrators show any greater wisdom than the average house wife in the disposition of our always limited budgets. Unquestionably the first step toward improvement both for the house wife and for the school admin-

istrator is to secure definite, detailed and significant knowledge of the actual disposition of the budget.". The report of Superintendent Spaulding shows where every dollar spent for instruction has been used. More of such reports would establish unit costs in the educational world as in the business world and give to the public a more intelligent comprehension of how its willingly given money is spent. In addition to this splendid report of Dr. Spaulding, Munroe in his study of High School costs in Kansas, has given us most valuable data, and Bobbitt, in his High School Costs and Survey of the South Bend, Indiana, Schools, has brought out helpful and interesting ideas in statistical methods as applied to High School costs.

The problem to beworked out in this brief paper is the determination of the costs of the unit of instruction in the various High School subjects as taught in a number of cities and towns in the State of Maine.

The purpose is first (1) to begin the establishment of standards of High School costs in Maine (2) to determine the comparative costs of the same subjects in different schools in our state and to judge whether we are wasting our money or not (3) and to determine the comparative costs of these different subjects of instruction in our state with those in other states where similiar studies have been made.

The source of the material used in this study in addition to the data found in the bibliography given, has been secured from the superintendents and teachers of the various High Schools which have been used. It is through the cooperation of these men and women that this study has been made.

STEPS IN THE ATTACK OF THE PROBLEM

1. Determination of unit
2. Securing data--after experimenting with two schools for sometime the questionnaire given on the next page was sent out.
3. Tabulating data by subjects through the aid of Blank 11.
4. Solving problem

Method employed. This questionnaire was sent out to the superintendents of the following towns: Bangor, Waterville, Old Town, Presque Isle, Brewer, Orono, Hampden and Rockland. These data having been secured from the several towns, the next step was the tabulation of all similiar items of the same subject taught by different teachers, then came the arrangement of these data into the different tables with their graphical representations and from these the conclusions were reached.

The Unit of Instruction is the student hour, one student attending class for sixty minutes, thus the number

of student hours which a teacher has for a class containing 15 students and meeting for five periods of instruction of 45 minutes length during the week would be 56 ¼ student hours or $5 \times 15 \times \frac{45}{60}$. All class periods have been reduced to their fractional part of 60 minutes.

A double period as in the case of laboratory work has been counted as two periods, because it takes two periods of the teacher's time.

Such activities as conference hours, study periods, and coaching athletics, have not been considered unless these were regarded as part of her regular teaching work when classes were assigned. If a teacher has taught one period a day in a school which has a daily schedule of six periods, one sixth of her salary has been apportioned to the subject taught. No account has been taken of the cost of administration or supervision, since the study has been confined to the cost of instruction as paid in the salary of the teacher. The median has been used for the central tendency, since this seems more relaible and is better for comparative purposes than the mode or average. Sources of error may possibly arise from a difference in understanding of items asked for in the questionnaire, but great care has been taken in every instance to make all data accurate and in cases of comparative data where different units of instruction have been used

to reduce them all to the student hour.

The eight schools used in this study are very different in number of pupils, teachers, buildings and equipment.

The following table shows the number of pupils and teachers as given in the Maine School Report of 1916.

1916	Teachers	Pupils
Bangor	35	824
Brewer	6	136
Hampden	5	104
Orono	6	116
Old Town	9	219
Presque Isle	10	270
Rockland	9	250
Waterville	10	228

These are all Class A schools and the results of the courses in the same subjects are accepted by our State University as of equal value in college entrance requirements, that is, whatever the cost we assume that the quality of the instruction is approximately equal. Then we are justified in concluding that one town or city is often paying twice or three times as much for the same quality of instruction as another. Small classes of students in a subject or the high salary of a teacher will place the cost of instruction higher than average classes and average salaries for teachers.

The following tables 1-8 show the cost of instruction per student hour in each subject taught in the several cities and towns. These tables are also expressed graphically.

BANGOR	TABLE I
Man. Tr.	.38
Greek	.33
Mach. & Sh. Wk.	.117
Free H.Dr.	.112
German	.094
Mech. Dr.	.069
Dom. Sci.	.067
	Med.0665
Science	.066
History	.057
Com. Subj.	.054
Latin	.0502
Math.	.048
French	.045
English	.045

BREWER	TABLE II
German	.149
Science	.140 .136
Latin	.133
French	.0505 .041 Med
History	.033
Com. Subj.	.028 .027
English	.026
Math.	.026

HAMPDEN	TABLE 111
Math.	.147
Com. Sub.	.136 .135
Latin	.134
Science	.103Med.101
Teach Tr.	.099
History	.066 .061
English	.056
French	.048

Zone of Safety

ORONO	TABLE IV
French	.078
Latin	.077
Math.	.074
Science	.066 Med.
History	.060
Com. Sub.	.052
English	.036

OLDTOWN	TABLE V
Man. Tr.	.183
Latin	.066 .0655
Science	.065
Math.	.056
~~Com. Sub~~	Med.0545 .053
English	.044
French	.0435 .043
History	.033

PRESQUE ISLE	TABLE VI
Mech. Dr.	.173
Agri.	.092
Science	.053
French	.049
Latin	.042 .0365Med.
English	.031
Com. Sub.	.0304
Math.	.029
History	.028
Civics	.028

ROCKLAND	TABLE VII
Science	.073
French	.052 .0514
Civics	.0503
Latin	.0508
Math.	.049 Med.
Spanish	.043
History	.037 .0365
Com. Sub.	.036
English	.033

WATERVILLE	TABLE VIII	
German	.087	
Science	.061	.0575
Latin	.054	
French	.046	.042
Civics	.039	
Com. Sub.	.036	.035
Math.	.034	
English	.032	

A comparison of the median costs of all the subjects in the different towns gives us the following table:

HAMPDEN	.101	
Bangor	.0665	.0662
Orono	.066	
Oldtown	.0545	.051 Median
Rockland	.049	
Waterville	.042	.0415
Brewer	.041	
Presque Isle	.0365	

ranging from Hampden with its median of .101 to Presque Isle at .0365, Oldtown and Rockland are nearest the median of this table. Both of the extremes Hampden and Presque Isle lie outside the so-called zone of safety. The inference is that

Hampden is paying too much on the average for each student hour and Presque Isle too little. A later comparison perhaps with similar data will help us to decide the question.

By collecting the costs from the preceding tables we are able to find the actual prices paid for instruction in one subject in the different towns.

I English

TABLE X

Hampden	.056		
Bangor	.045	.0445	
Oldtown	.044		
Orono	.036	.0345	Med.
Rockland	.033		
Waterville	.032	.0315	
Presque Isle	.031		
Brewer	.026		

Our table shows us that Hampden is paying twice as much per student hour as Brewer for its English instruction. The number of pupils in the average class is less in the former town than the latter. We find the variation in costs in English is less than in some other subjects, because it is required, and the classes are usually larger than in an old conservative subject as Latin or a new subject like manual training. Then, too, the salary of most English teachers is not high

because there are more teachers available in this subject than in newer subjects for which fewer teachers are trained. The median is .0345.

SCIENCE TABLE XI

The conditions surrounding the teaching of this subject are often quite different, the length of laboratory period, size of classes, number of times per week, and salary of teacher.. Here Brewer is paying more than 2 1/2 times as much for its science as Presque Isle.

Brewer	.140
Hampden	.103
	.088
Rockland	.073
Bangor	.066
	Med.066
Orono	.066
Oldtown	.065
	.063
Waterville	.061
Presque Isle	.053

A comparison of this table with that of English shows that the lowest cost in science .053, is nearly the same as the highest in English .056 per student hours. Evidently we are considering a student hour of science worth more than one of English. The number of student in class is less than in English because this is an elective subject to some ex-

tent where English is a required subject. Adjustments might well be made by the alteration of courses.

MATHEMATICS — TABLE XII

Hampden	.147	
Orono	.074	.065
Oldtown	.056	
Rockland	.049	.0485
Bangor	.048	
Waterville	.034	.0315
Presque Isle	.029	
Brewer	.026	

.048 per student hour represents the median or the consensus of opinion as to a fair price to be paid for the teaching of mathematics. Here again Hampden is paying too much in comparison with other schools—nearly five times as much as Brewer.

LATIN — TABLE XIII

.134 Hampden	
.133 Brewer	.105
.077 Orono	
.066 Oldtown	.060
.054 Waterville	
.0508 Rockland	.0505
.0502 Bangor	
.042 Presque Isle	

Latin is a subject which is standardized in our schools in regard to aims and methods--but still there is a wide variation on either side from the median which is .060 per student hour. The high cost of this subject is most often caused by the small size of the classes. Many towns are paying too much for this commodity as a study of needs in other directions might show. Costs of different subjects are simply the result of our haphazard way of doing our school business, not of any careful planning as to the value of the subject to the community.

Adjustments in Latin might be made by reducing the length of periods or number of meetings per week when the class is small and even then accomplishing the required work. Bangor High teaches Greek at a cost of .33 per student hour. Superintendent Spaulding of Newton feels that .17 per student hour is quite too much for the city of Newton to pay for that subject.

FRENCH	TABLE XV		GERMAN	TABLE XVI	
Orono	.078		Brewer	.149	
Rockland	.052		Bangor	.094	Med.
		.0512			
Brewer	.0505		Waterville	.087	
Presque Isle	.049				
		.0485 Med.			
Hampden	.048				
Waterville	.046				
		.0456			
Bangor	.045				
Oldtown	.043				

The variation in French is not as wide as in many other subjects, although Orono is paying 1 ¾ times as much as Oldtown for a student hour. The opening of the parochial school in Orono, teaching at present two years of H.S. work would account for the somewhat smaller classes and consequent higher price per student hour. The adjustments have not yet been made to meet the new situation.

The cost of German especially in the two smaller schools of Brewer and Waterville seems quite out of proportion to what might be expected to be the needs of either community. The same amount of moneyon a vocational subject might accomodate more students. It is seldom advisable for our small schools to attempt two modern languages.

Rockland is teaching Spanish to 29 pupils at a cost of .043 per student hour.

HISTORY — TABLE XV

Hampden	.066
Orono	.060
Bangor	.057 — .0585
Rockland	.037
Oldtown	.033 — Med..035
Brewer	.033
Waterville	.032 — .0325
Presque Isle	.028

The table of costs for history does not show that we have as yet begun to place the emphasis on the teaching of this subject that our present aim of education--for citizenship would seem to demand. The price seems too low in comparison with the value of this subject to many others for which we are paying quite too much. Courses in History are too much neglected, they are not continuous and are taught quite too often in our state by teachers of other subjects.

COMMERCIAL SUBJECTS TABLE XVI

.136 Hampden

.054 Bangor _____.0535

.053 Oldtown

.052 Orono

_____.044 Median

.036 Waterville

.036 Rockland

_____.0331

.0304 Presque Isle

.028 Brewer

Hampden while not paying its teachers as much as other towns seems to be in the majority of cases paying more for a student hour. She seems to be attempting so many courses that the classes in each are small, thus raising the cost. A more thorough study of the needs of the town is apparently needed. The first attempt at vocational

training as commercial subjects has shown us that students enough in High School are taking this course so that the price is much lower than many subjects which are better standardized. There has been rapid adjustment in this subject and teachers are able to handle good-sized classes to an advantage.

MAN. TR.	TABLE XVII	MECH. DR.	TABLE XVIII
.38	Bangor	Presque Isle	.173
.183	Oldtown	Bangor	.069

At first these costs of instruction seem too extravagant, but these subjects are just beginning to find their way into our schools. There are few teachers available, which makes for higher salaries. Then, too, many students and parents are still doubtful as to the value of practical subjects in High School, so at first the number of students electing these subjects is small. A careful study of the students and a sincere attempt toward vocational guidance will help more children and parents to choose intelligently what their High School course shall be. This will result in a better adjustment of the size of classes, especially in vocational work.

A collection of the medians for the same quantity of instruction in these various towns gives us the following table:

Mean Costs of High School Subjects and Zones of Safety

	Median		Zone of Safety	Table XIX
Greek	.33			
Man. Tr.	.281			
Mech. Dr.	.121	.110		
Teacher Tr.	.099			
German	.094			
Science	.066		.063-.088	
Latin	.060	Med.	.0505-.105	
Math.	.0485		.0315-.065	
French	.0485		.0455-.0512	
Com. Subj.	.044	.0435	.0331-.0535	
Spanish	.043			
History	.035		.0325-.0585	
English	.0345		.0315-.0445	

The subjects not showing zones of safety are taught in only one or two schools and so present little opportunity for comparison. Whether we decide it intelligently or foolishly, we are assigning the value to a subject when we determine the expenditure for its teaching. In Bangor, for example, we are saying 2.61 student hours of Man. Tr. are worth as much to us as 22.1 students hours of English--and the latter subjects is really the foundation of our present High School course.

The following tables show what the different cities regard as of equal value in student hours of the different subjects or the number of student hours for $1.00.

Bangor	Table XX	
English	22.1	
French	21.8	
Math.	20.5	20.2
Latin	19.9	
Com. Subj.	18.2	
History	17.4	
Science	15.	Med.
Dom. Sci.	14.7	
Mech. Dr.	14.4	
German	10.5	9.6
Free H.D.	8.8	
Greek	3.3.	
Man. Tr.	2.61	

Brewer	Table XXI	
English	37.5	
Math.	37.2	35.9
Com. Subj.	34.7	
History	30.1	Med. 24.9
French	19.7	
Latin	7.48	7.30
Science	7.13	
German	6.6	

Hampden	Table XXII		Orono	Table XXIII	
French	20.5		English	27.1	
English	17.7	16.2	Com. Subj.	19.1	
History	14.8		History	16.4	
Teach. Tr.	10.01	Med. 9.84	Science	15.	Med.
Science	9.68		Math.	13.4	
Com.Subj.	7.31	7.08	Latin	12.9	
Latin	6.85		French	12.8	
Math.	6.73				

Oldtown	Table XIV		Rockland	Table XXV	
History	29.8		English	29.6	
French	22.9	22.5	Com. Subj.	27.2	26.85
English	22.2		History	26.5	
Com. Subj.	18.5	18.1 Med.	Spanish	23.2	
Math.	17.7		Math.	20.06	
Latin	15.08	15.075	Civics	19.8	
Science	15.07		Latin	19.6	19.2
Man. Tr.	5.4		French	18.8	
			Science	13.7	

Presque Isle	Table XXVII	Waterville	Table XXVII
Civics	34.8	History	30.8
History	34.4	English	29.9
	33.8		29.3
Math.	33.1	Math.	28.8
Com. Subj.	32.8	Com. Subj.	27.7
	Med. 32.45	French	21.3 Med.
English	32.1	Latin	18.4
Latin	23.2	Science	16.1
	20.9		13.7
Science	18.7	German	11.4
Agri.	10.8	Civics	2.5

These are the relative values which the school officials have unconsciously assigned to the different subjects. The charts following show these things graphically. The principal value of a study of these relative values shows us that no intelligent thought has preceded action; that we must make a study of local values and needs and on these base the values which we shall give to subjects. When Presque Isle feels that 10.8 hours of agriculture and 34.8 of civics are equivalent, she is emphasizing the vocational as three times the value of education for community life. When Oldtown places 5.4 student hours of Man. Tr. as the equivalent of 29.8 hours of history, she is either over estimating Man. Tr.

or underestimating History. The first step toward improvement is a complete understanding of the values assigned and then a readjustment until we are really expending our money for subjects in proportion as they are valuable to the community. We should attempt to secure a maximum of cost at a minimum of service.

The cost of a student hour of instruction depends upon two things: the size of the classes and the salary of the teacher. When the cost of a subject lies in the upper quartile, either the number of pupils receiving instruction is small or the salary for the subject is high. The number of pupils in the classes varies greatly and the average taken does not show this variation clearly enough when two or three teachers are giving part of their time to the same subject and when the program is arranged to suit the convenience of the teachers rather than to meet the real needs of the pupils. To be efficient, classes must not be too large so that the teacher lose sight of the industrial pupil, nor must they be so small that they are quite too extravagant in price.

The following tables show the average size of classes by subjects in these different towns.

Average size of classes in English and Mathematics.

Average size of classes in English and Mathematics.

Town	No. Pupils	Town	No. Pupils
Presque Isle	33.5	Presque Isle	27.4
Brewer	25.5	Waterville	25.6
	25		24.4
Bangor	24.5	Bangor	23.2
Rockland	23.8	Brewer	22.
	Median 23.7+	20.8	
Waterville	23.7	Oldtown	19.7
Orono	20.8	Rockland	15.2
Oldtown	19.7		14.1
		Hampden	13.
Hampden	17.	Orono	11.8

A thoughtful survey of these tables show us in part the cause of the variation of prices in instruction for the student hour. Our table for unit costs in English placed Hampden as paying the highest amount and Brewer as the lowest. This table shows Hampden with the fewest pupils in class and Brewer next to the highest. Thus we see a close correlation between the number of students in the class and the unit cost. In the Newton High School report we find this statement that the increase of 1.9 pupils per recitation decreases the amount per pupil cost by $3.24. Thus a better adjustment of the number of pupils would make the unit costs of instruction more nearly equal.

History

School	No. Pupils	
Brewer	27.5	
Waterville	25.5	24.7
Presque Isle	24.2	23.6
Bangor	23.	20.8
Orono	18.6	
Rockland	16.3	15.7
Oldtown	15.	
Hampden	12.	

Science

School	No. Pupils	
Presque Isle	27.5	
Orono	24.	23.4
Bangor	22.8	21.2
Waterville	19.7	17.6
Rockland	15.6	
Oldtown	14.6	14.3
Hampden	14.6	
Brewer	12. 2/3	

Commercial

Presque Isle	30.5	
Bangor	27.9	25.8
Brewer	23.7	
Waterville	22.1	21.9
Rockland	21.7	
Oldtown	19.1	14.1
Orono	10.8	
Hampden	5.3	

French

Presque Isle	29.6	
Bangor	23.6	20.7
Waterville	17.8	
Oldtown	17.7	16.3
Hampden	15.4	
Rockland	14.4	13.9
Brewer	13.4	
Orono	11.	

LATIN

School	No. Pupils
Bangor	24.6
Waterville	16.4 16.0
Presque Isle	15.7
Rockland	14.3 13.1
Brewer	12.
Oldtown	11. 10.8
Orono	10.6
Hampden	5.

CIVICS

School	No. Pupils
Rockland	30.
Presque Isle	29.
Waterville	21.

GERMAN

Brewer	4.5
Waterville	9.5
Bangor	11.7

Bangor in its Greek classes has an average of 10 students in Free Hand Drawing, 9.2 Domestic Science 17 1/2 Mach. & Wood Work 19 and 8 in Man. Tr. In this last subject Oldtown has an average of 6.5, Rockland teaches Spanish to 14.5 students, and Hampden gives a Teacher Training Course for 8 students. These figures show us a high correlation between the small number of students in the class and high cost of unit instruction.

The following table shows the median number of pupils in class in all the schools:

TABLE XXVIII

	MEDIAN		ZONE OF SAFETY	
Civics	29		21 -	30
English	23.7		20.2-	25
Commercial	21.9		14.9-	25.8
History	20.8	20.8	15.7-	24.7
Math.	20.8		14.1-	24.4
Mach. & Wood Work	19.			
Science	17.6		13.3-	23.4
Dom. Sci.	17.5	16.9 Median		
French	16.3		13.9-	20.7
Spanish	14.5			
Latin	13.1		10.8-	16.
Greek	10.	9.75		
German	9.5			
Free H.D.	9.2			
Teacher Tr.	8.			
Man. Tr.	7.2		65.8	

This table shows the median for all subjects in all these schools as 16.9 pupils in class and the zone of safety lying between 9.75 and 20.8. It also shows quite clearly why Man. Tr. and Teacher Training are so much more expensive than English and civics chart shows these positions. We might perhaps ask what is the average number of pupils which a teacher

should be expected to teach. Bobbitt, in his study declines to set any standard, but finds that the median number of students for all subjects in the 25 cities which he uses is 19, and the zone of safety from 15-25. Dr. Spaulding gives the average in the city of Newton for 1903-'04 as 22.8, and in 1910-'11 as 24.7. Munroe tabulates 18.7 pupils as the median of first and second class cities in Kansas with a zone of safety of 15.3-21.5, and in third class cities a median of 11.7 with a zone of safety of 8.6-14.3. Comparing our figures with these we find our teachers are on the average teaching fewer pupils than in the other schools schools, with the exception of the 3rd Class cities of Kansas. These schools, smaller in size, are probably more nearly comparable with ours.

Another factor in the variation of costs is the salary of the teachers. The following tables show the average salary of teachers by subjects.

MATHEMATICS			SCIENCE		
Hampden	$1200.		Brewer	1583.16	
Oldtown	1005.42	915.86	Hampden	1487.46	1443.73
Bangor	826.30		Orono	1400.	
Waterville	800.00	778.57	Presque Isle	1333.33	1271.64
Presque Isle	757.14		Waterville	1209.96	
Orono	700.		Bangor	1076.44	1031.97
Rockland	691.42	695.71	Rockland	987.50	
Brewer	518.54		Oldtown	748.06	

ENGLISH			HISTORY		
Presque Isle	818.18		Orono	949.99	
Bangor	799.98	779.99	Bangor	949.90	866.16
Rockland	760.00		Brewer	782.42	
Waterville	712.48		Waterville	750.	712.50
Oldtown	677.24		Presque Isle	675.00	
Orono	674.98		Rockland	590.	545
Brewer	534.26		Hampden	500.	
Hampden	518.72		Oldtown	358.86	

FRENCH			LATIN		
Bangor	782.48		Brewer	1412.38	
Rockland	766.66	758.33	Bangor	966.64	883.31
Waterville	750.		Waterville	799.98	
Orono	724.78	712.39	Orono	724.96	713.47
Rockland	700.		Oldtown	701.98	
Brewer	599.98	562.49	Rockland	700.	675.
Hampden	525.		Presque Isle	650.	
Oldtown	459.66		Hampden	525.	

COM. SUB.

Rockland	115.00	
Bangor	1095.22	980.73
Oldtown	866.25	
Orono	775.00	759.72
Presque Isle	744.44	
Waterville	719.22	659.61
Brewer	600.	
Hampden	525.00	

MECH. DR.

Presque Isle	1500	1250
Bangor	1000	

FREE HAND DRAWING

Bangor	750.	

MANUAL TRAINING

Bangor	1099.92	1057.93
Oldtown	1015.94	

MACHINE AND WOOD WORK

Bangor	1600.	

GERMAN

Bangor	799.98	
Waterville	750.	
Brewer	599.98	

CIVICS

Rockland	1450.	
Presque Isle	800.	
Waterville	750.	

AGRICULTURE

Presque Isle	1600	

SPANISH

Rockland	600.	

GREEK

Bangor	800.	

DOMESTIC SCIENCE

Bangor	700.	

A study of these tables in comparison with the cost of instruction per student hour shows us that the cost of the teacher by subjects is a great factor as well as the size of classes. In many cases we find both factors entering in as in Manual Training, Machine and Wood Work and Agriculture. In Greek the dominating factor seems to be the small size of classes. In Science more often the salary of the teacher raises the cost of instruction. The adjustment of the size of classes is an administrative problem that at the present time can be more easily arranged than the salary of teachers by subjects, for in the latter case the supply of teachers for the newer subjects is not equal to the demand. If, however, we applied business principles to our school work and raised the salaries of all teachers according to efficiency in service as shown in actual results in the work of the pupils, improvement in service and length of service, then we should not find the variation between salaries by subjects that we do now.

The following table shows the median of all salaries of all the teachers by subjects:

TABLE XXIX

SUBJECT	MEDIAN	ZONE OF SAFETY
Mach.Shp Wk.	1600	
Agriculture	1600	
Science	1271.64	1031.97-1443.73

MECH. DRAW.	1250.			1153.96
Man. Tr.	1057.93			
Greek	800.00			
Civics	800.			
Mathematics	778.57	750-1450	Med.	769.14
Commercial	759.72	659.61-980.73		
Free Hand Dr.	750			
German	750	599.98-799.98		
Latin	713.47	675	883.31	712.98
History	712.50	545	866.16	
French	712.39	562.49	758.33	
Dom.Sci.	700.			
English	694.86	604.62	779.99	

TABLE XXIX

There is only one study available, Bobbitt's which has a table directly comparable to this. In his table the salaries vary from $1,140 for Shop Work to $776 for Household Arts. This table shows Machine and Shop Work taught for $1600, and English the lowest, at $694.86, showing a wide spread in this study. There seems to be no just reason why a teacher of English or Domestic Science should be paid so much less than a teacher of Machine and Shop Work, except the small number of teachers. A publication of the facts in regard to teachers' salaries ought to assist in regulating this difficulty by en-

couraging students to study these subjects where teachers are needed.

There should be a more detailed study of these factors throughout the State of Maine, as well as in other states and a comparison of data to establish norms or standards and to bring out more fairness and equability in the salaries of teachers of different subjects.

COMPARATIVE DATA 1

By an examination of data which has been worked out in similiar studies, we find Kansas cities of the first and second class have the following mediand:

English	.0453	Com. Sub.	.094
Mathematics	.048	Nor. Tr.	.129
History	.0493		
Science	.056		
Agriculture	.0613		
Mod. Lang.	.064		
Latin	.0693		
Household Arts	.0509		
Man. Tr.	.072		
Com. Sub.	.048		
Nor. Tr.	.0986		

And in the third class cities

English	.0546
Math.	.064
History	.0666
Science	.080
Agriculture	.076
Mod. Lang.	.078
Latin	.0746
Household Arts	.0693
Man. Tr.	.0893
Com. Sub	

These two tables show us that the smaller or third class cities have a higher cost per unit of instruction. The study by Bobbitt of Chicago University on High School Costs based twenty-five high schools of heterogeneous size and situation shows the following means:

Shop work	.093
Normal Tr.	.092
Latin	.071
Commercial	.069
Mod. Lang.	.063
History	.062
Household Arts	.061
Science	.060
Mathematics	.059
English	.051
Agriculture	.048
Music	.023

Other studies from the University of Chicago present the following:

English	.042
Mathematics	.042
History	.044
Science	.045
Mod. Lang.	.057
Latin	.051
Drawing	.059
Household Arts	.062
Shop Work	.068
Commercial	.067
Agriculture	.024

Dr. Spaulding's study of Newton High School gives the following medians:

English	.052
French	.042
German	.068
History	.056
Math.	.053
Science	.082

Costs are also given for these subjects in the Technical and Vocational High, but as the Newton High seems to be more nearly comparable with our own High School, I have chosen to use these figures

The school survey of South Bend, Indiana, has these median costs:

Man. Tr.	.111
Pub. Speak.	.104
Latin	.085
Household Arts	.074
Dom. Sci.	.070
English	.066
Mod. Lang.	.063
Math.	.062
History	.062
Science	.062
Drawing	.051
Com. Subj.	.043
Phys. Tr.	.041
Music	.016

Comparing the median of our study with those of the preceding studies, we have the following comparison of medians in <u>English</u>.

South Bend, Indiana	.066
Kansas 3rd Class Cities	.0546
Newton, Mass.	.052
Univ. of Chicago (Bobbitt)	.051
Kans. 1st & 2nd Class	.0453
Univ. of Chic. 2nd Study	.042
Maine	.0345

SCIENCE

Newton, Mass	.082
Kansas 3rd Class cities	.080
Maine	.066
South Bend, Indiana	.062
Univ. of Chicago(Bobbitt)	.060
Kansas 1st & 2nd Class	.056
Univ. of Chicago, 2nd Study	.045

MATHEMATICS

Kansas 3rd Class	.064
South Bend. Indiana	.062
Univ. of Chicago(Bobbitt)	.059
Newton	.053
Maine	.0485
Kansas 1st & 2nd Class	.048
Univ. of Chicago 2nd Study	.042

LATIN

South Bend, Indiana	.085
Kansas 3rd Class	.0746
Univ.of Chicago(Bobbitt)	.071
Kansas 1st & 2nd Class	.0693
Maine	.060
Univ. of Chic. 2nd Study	.051

FRENCH

Kansas 3rd Class	.078
" 1st & 2nd class	.064
Univ. of Chic.(Bobbitt)	.063
South Bend, Ind.	.063
Univ. of Chic. 2nd class	.057
Maine	.0485
Newton	.042

Manual Training

Maine	.281
So. Bend,Ind.	.111
Kans. 3rd Class	.089
Kans. 1st & 2nd	.072

COMMERCIAL SUBJECTS

Kans. 3rd class	.094
Univ. of Chic. (Bobbitt)	.069
Univ. Chic 2nd study	.067
Kans. 1st & 2nd Class	.048
Maine	.044
South Bend	.043

HISTORY

Kans. 3rd class cities	.066
Univ. of Chic. (Bobbitt)	.062
South Bend	.062
Newton	.056
Kans. 1st & 2nd class	.049
Univ. of Chic.,2nd Study	.044
Maine	.035

In none of these comparative tables do we find Maine paying the most for a student hour of instruction, except in Manual Training. In Science, too, we are above the median showing that our teachers of at least two subjects are as well paid as those of the same subjects in other sections of the country, but when we compare our cost per student hour for English and History, especially the inference must be that we are paying quite too little for our teachers in those subjects especially where they are of such vital importance. In Latin, French and commercial subjects, too, I think we need not be at all proud of the costs. Either the teachers is overworked or the salary quite too small.

General Conclusions of the Study.

1. That a study of the unit costs of instruction shows quite too plainly that business methods are too seldom applied in determining them; that business men are not so much concerned in the efficient management of public affairs as of private affairs.

2. That few attempts have been made, and these especially through departments of education, which are usually supposed to be very theoretical to establish unit costs looking toward more efficient management of the High School budget; that there is a vast field opening up for study of this kind and that Departments of Education which desire to be in the foreground of education in their own states should with the assistance of the State Department of Education collect data, work out unit costs and establish standards.

3. That Maine on the whole is paying her teachers too small a salary in comparison with some other sections of the country.

4. That there is too great a variation between teachers' salaries in different subjects, and that these salaries should be based upon the efficiency of the teacher to produce results, rather than upon the desire of the superintendent to fill a vacancy.

5. That the unit cost of instruction in the various subjects should be determined by the value of the subject to the community, for example, and agricultural community would place more value upon the teaching of that subject than upon Latin or a Modern language.

6. That the cost of instruction is conditioned for the most part by the salary of the teacher and the number of pupils taught by the teacher.

7. That a more careful adjustment is needed in size of classes.

8. That more vocational guidance is needed to assist pupils in choosing subjects.

9. That small schools should not attempt to teach too many subjects.

10. That the policy of educators should be dissatisfaction until these matters have been thoroughly studied and continued attempts made to place school methods of business on a par with other business methods.

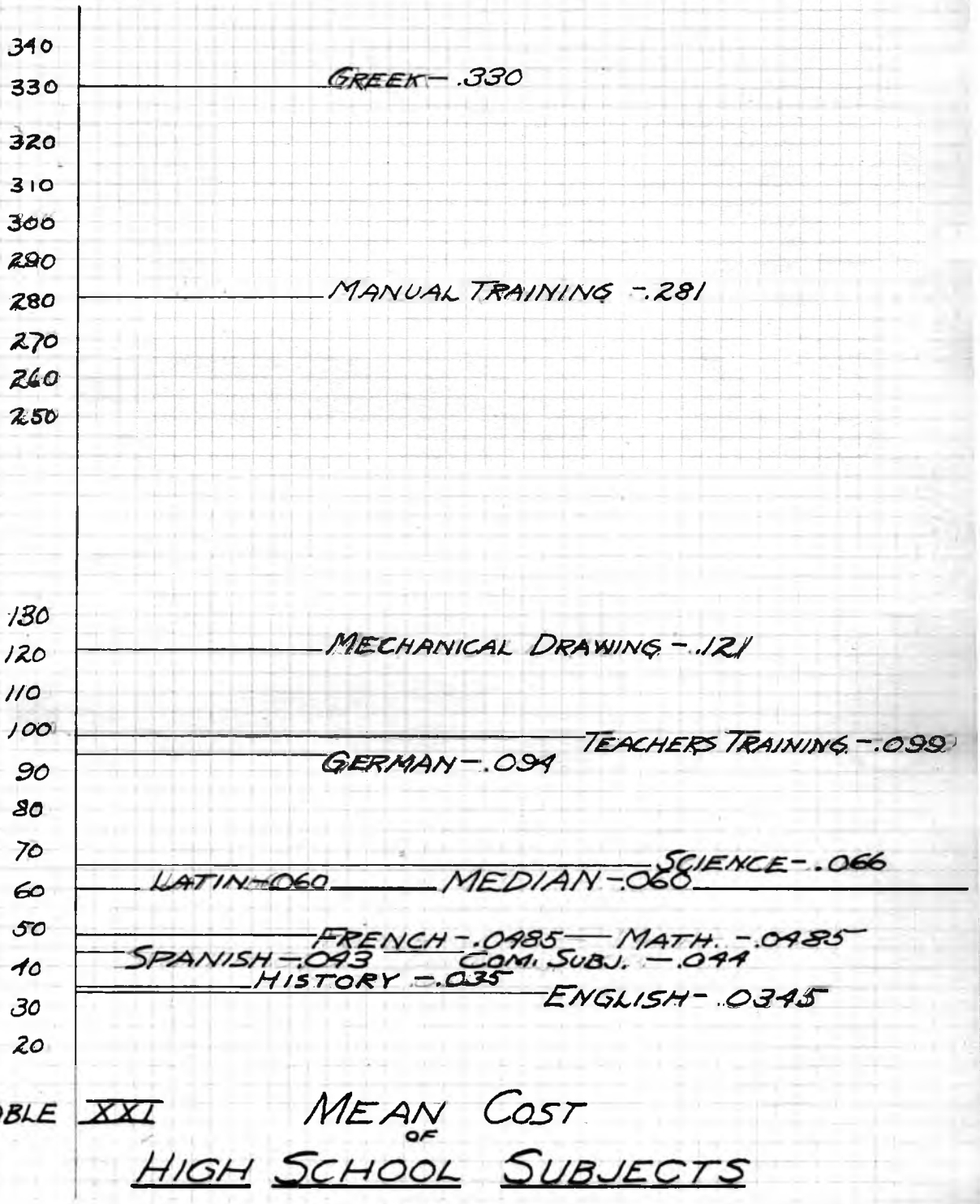

TABLE XXI

MEAN OF

HIGH SCHOOL SUBJECTS

IN ALL TOWNS –.

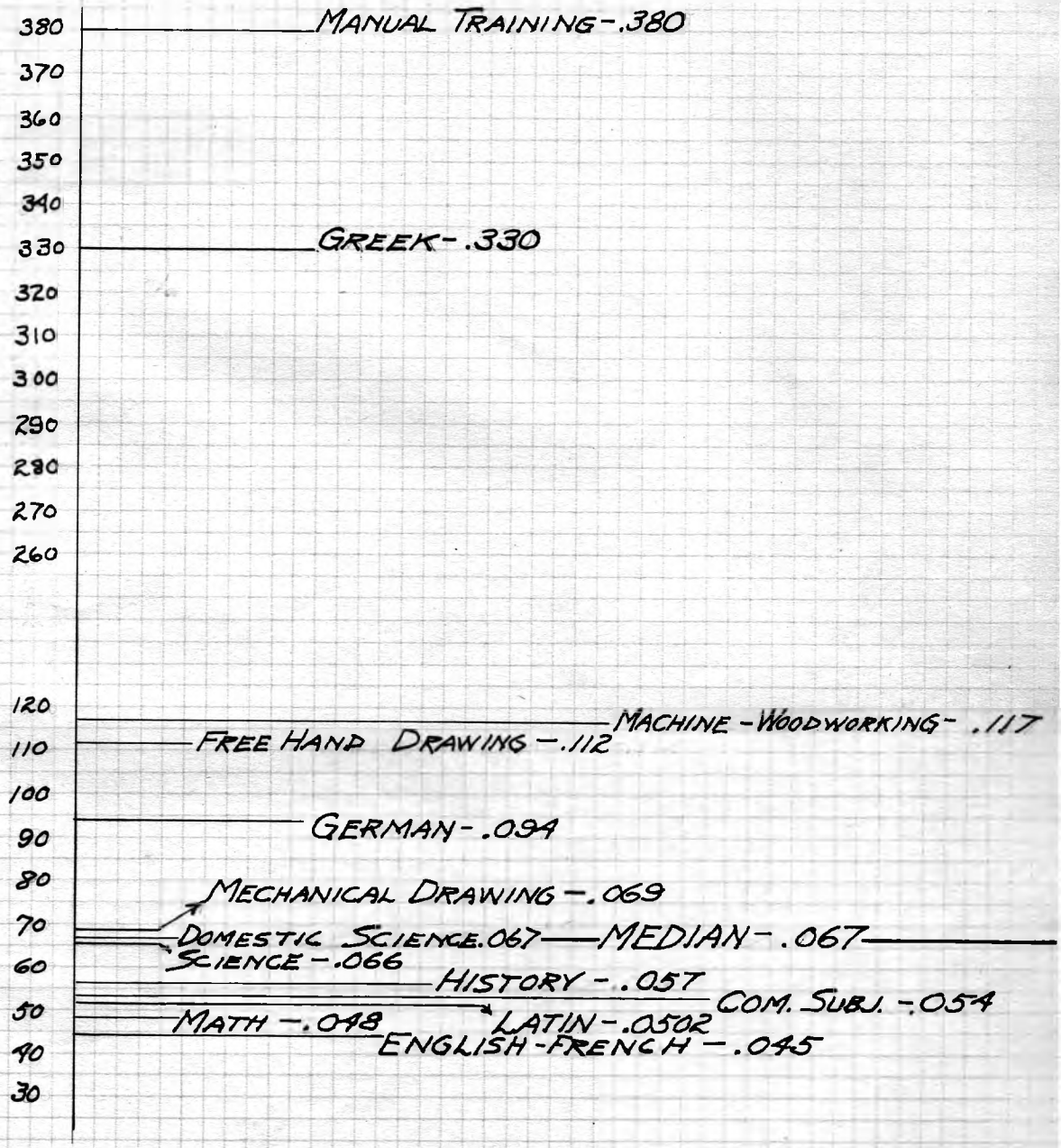

TABLE I. BANGOR HIGH SCHOOL

COST PER STUDENT HOUR: MEDIAN - .067

ZONE of SAFETY - .054 - .112

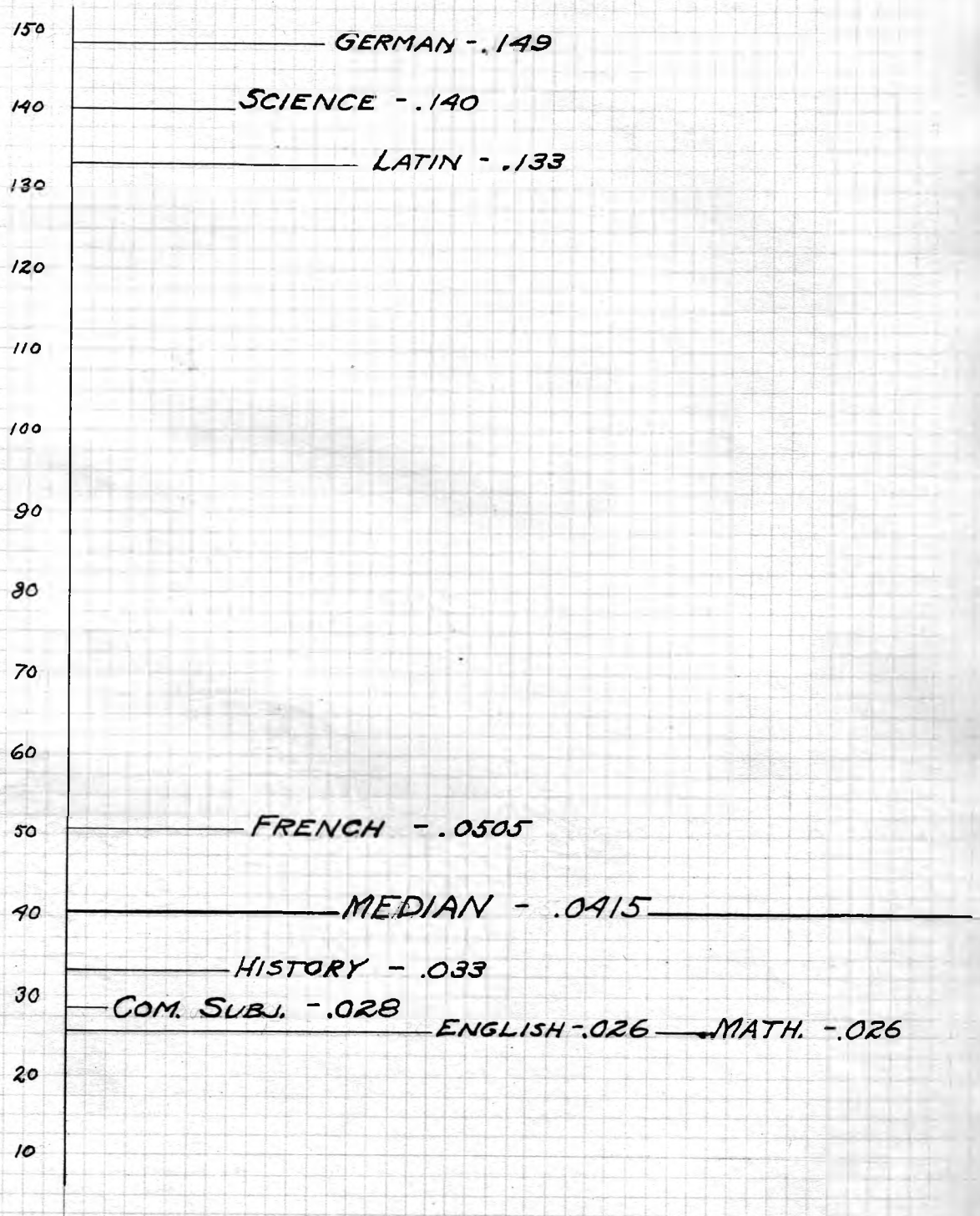

TABLE II

BREWER

COST PER STUDENT HOUR: MEDIAN - .04175

ZONE OF SAFETY - .027 – .1365

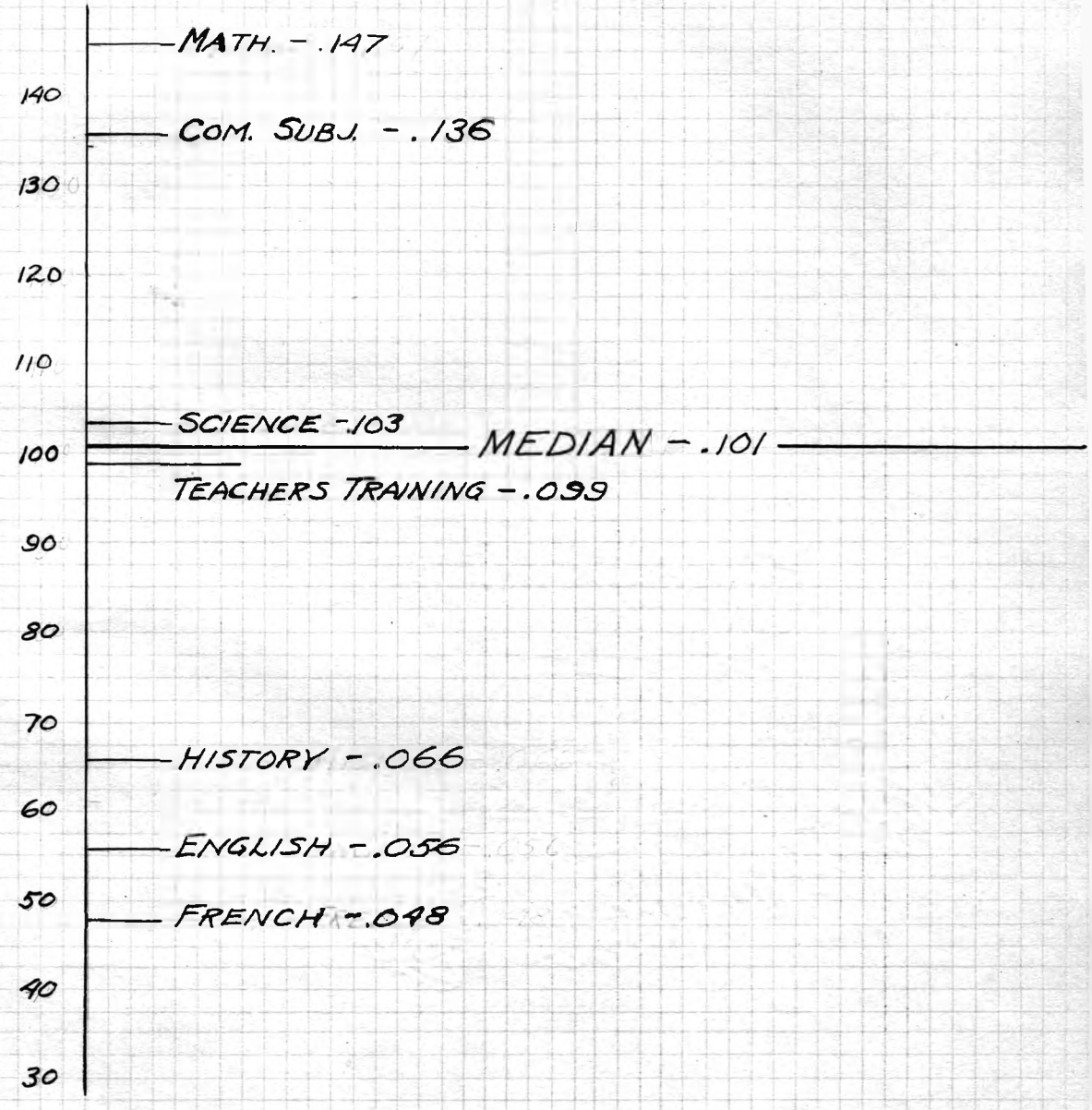

TABLE III

HAMPDEN

COST PER STUDENT HOUR: MEDIAN - .101
ZONE OF SAFETY - .061 - 0.135

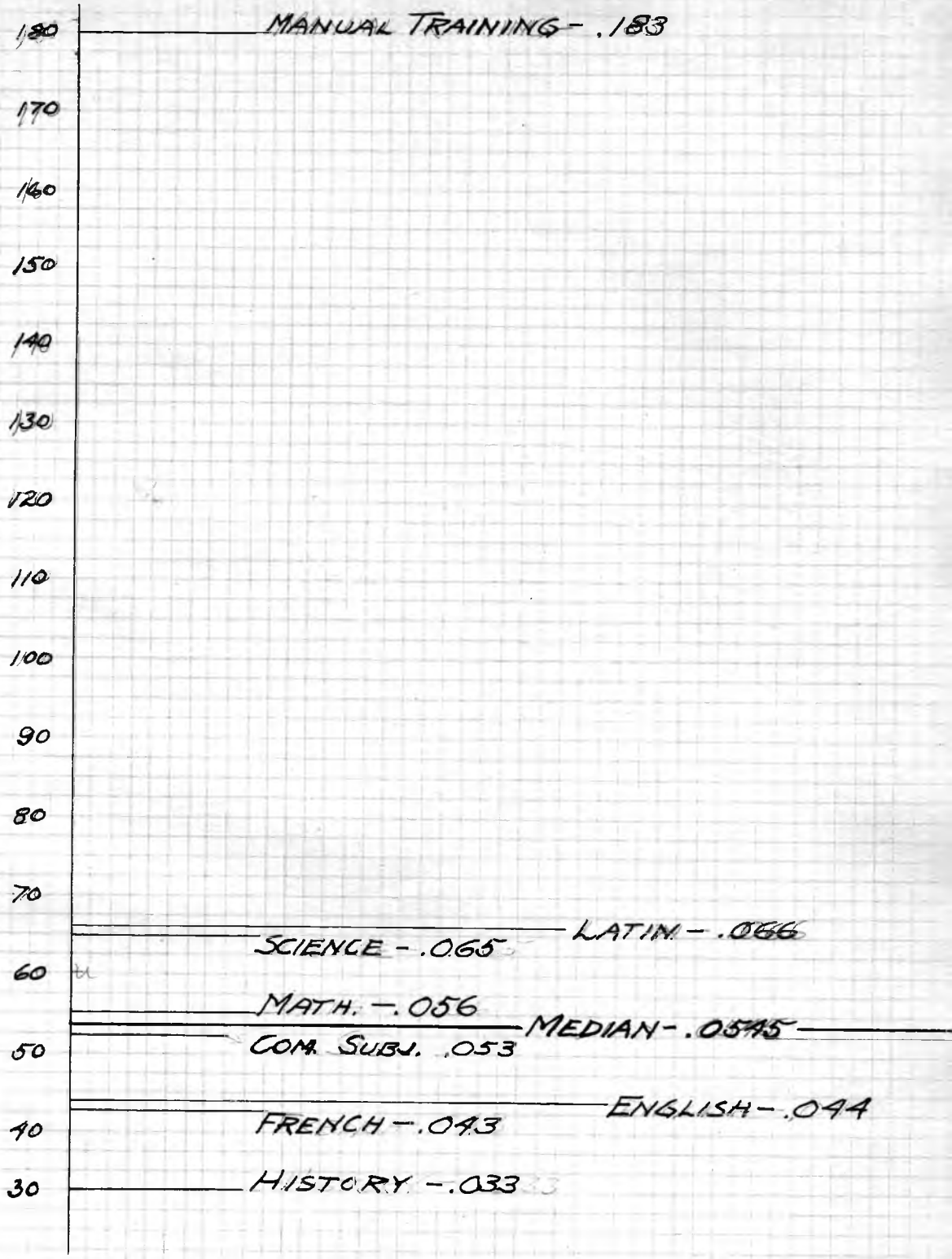

TABLE V

OLD TOWN

COST PER STUDENT HOUR: MEDIAN - .0545

ZONE OF SAFETY - .0435 - .060

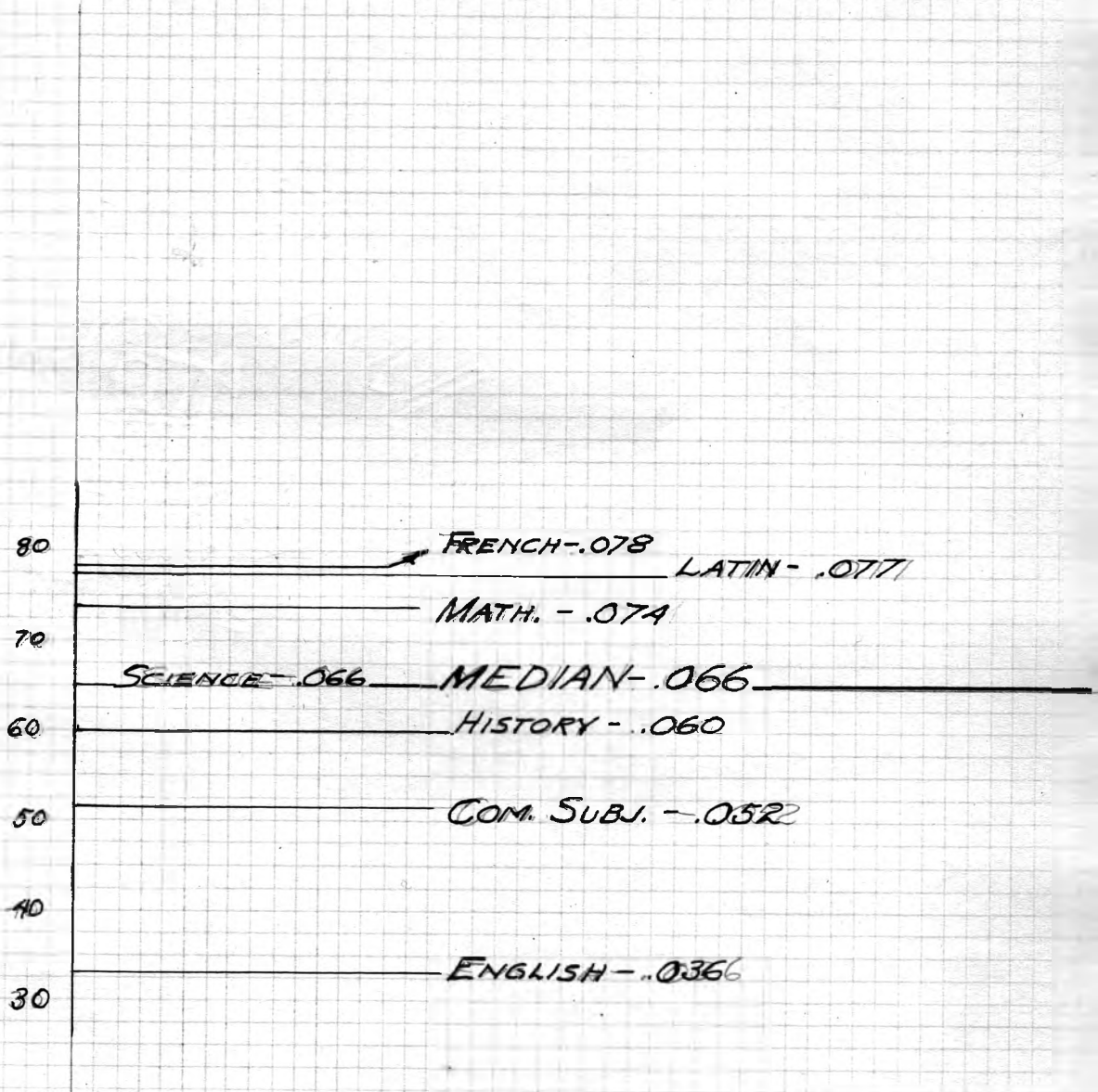

TABLE IV ORONO

COST PER STUDENT HOUR : MEDIAN - .066

ZONE OF SAFETY .052 - .077

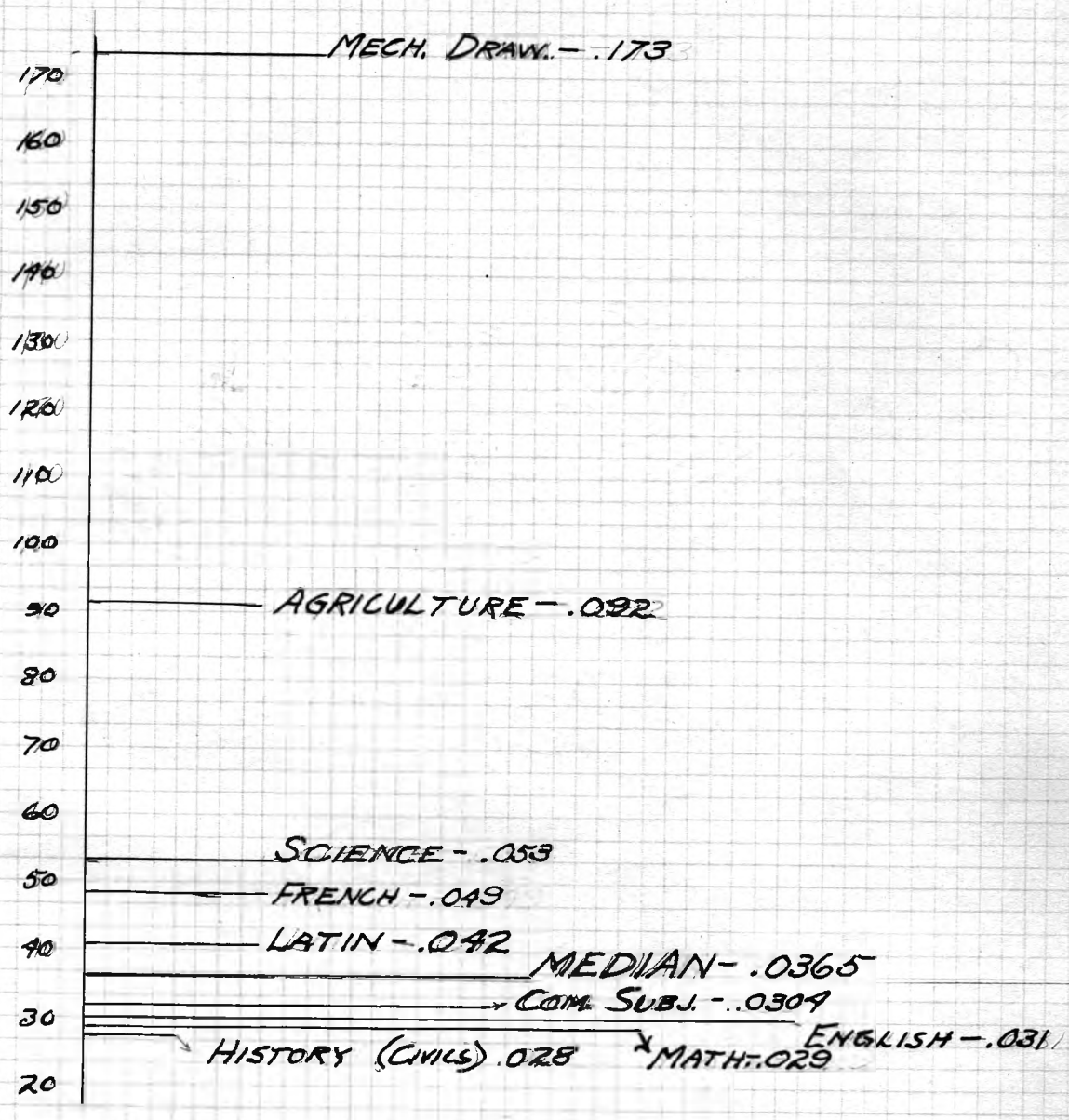

TABLE VI PRESQUE ISLE

COST PER STUDENT HOUR: MEDIAN: .0365

ZONE OF SAFETY .029 – .053

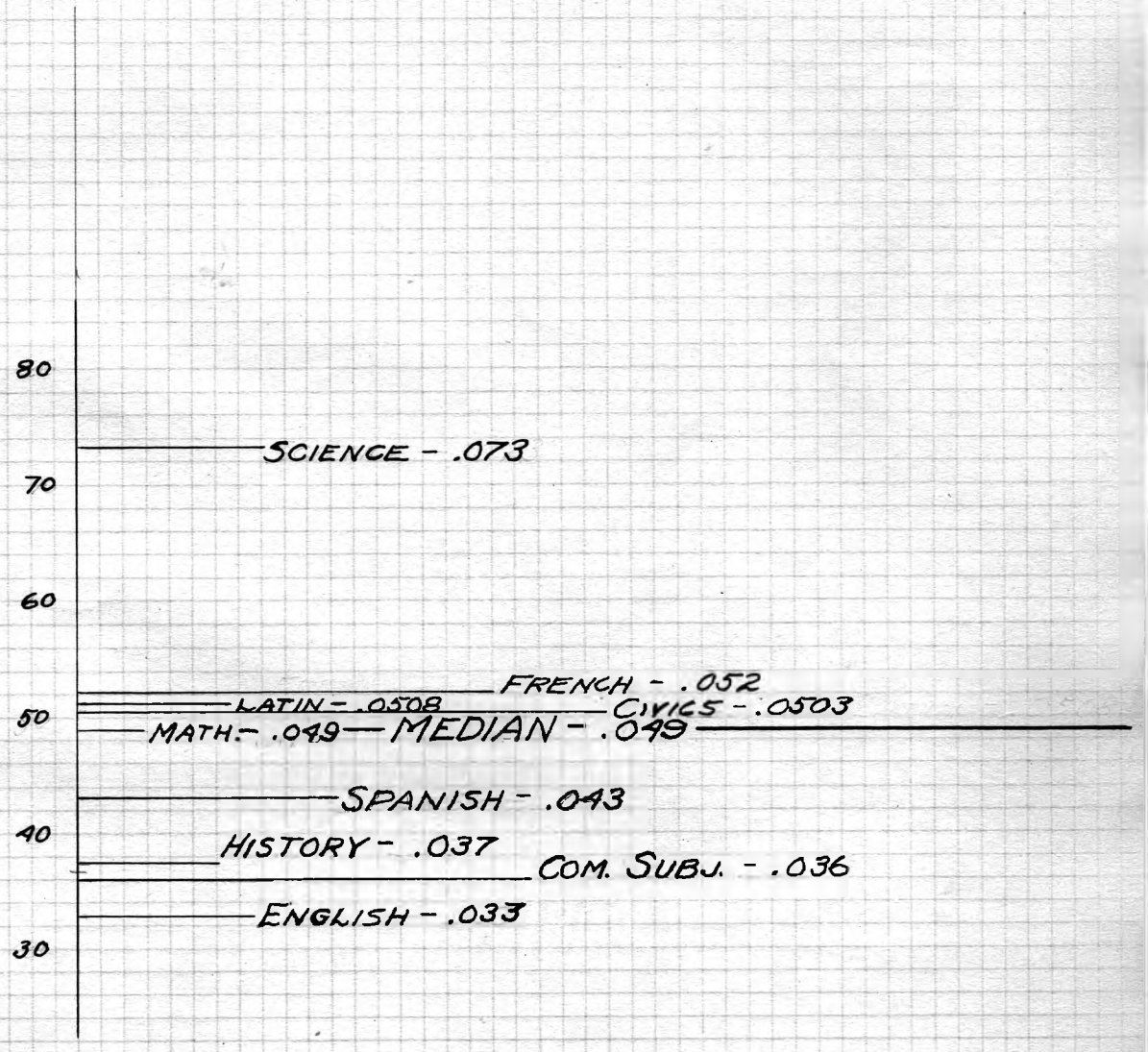

TABLE VII

ROCKLAND

COST PER STUDENT HOUR :- MEDIAN - .049

ZONE OF SAFETY - .0365 - .0514

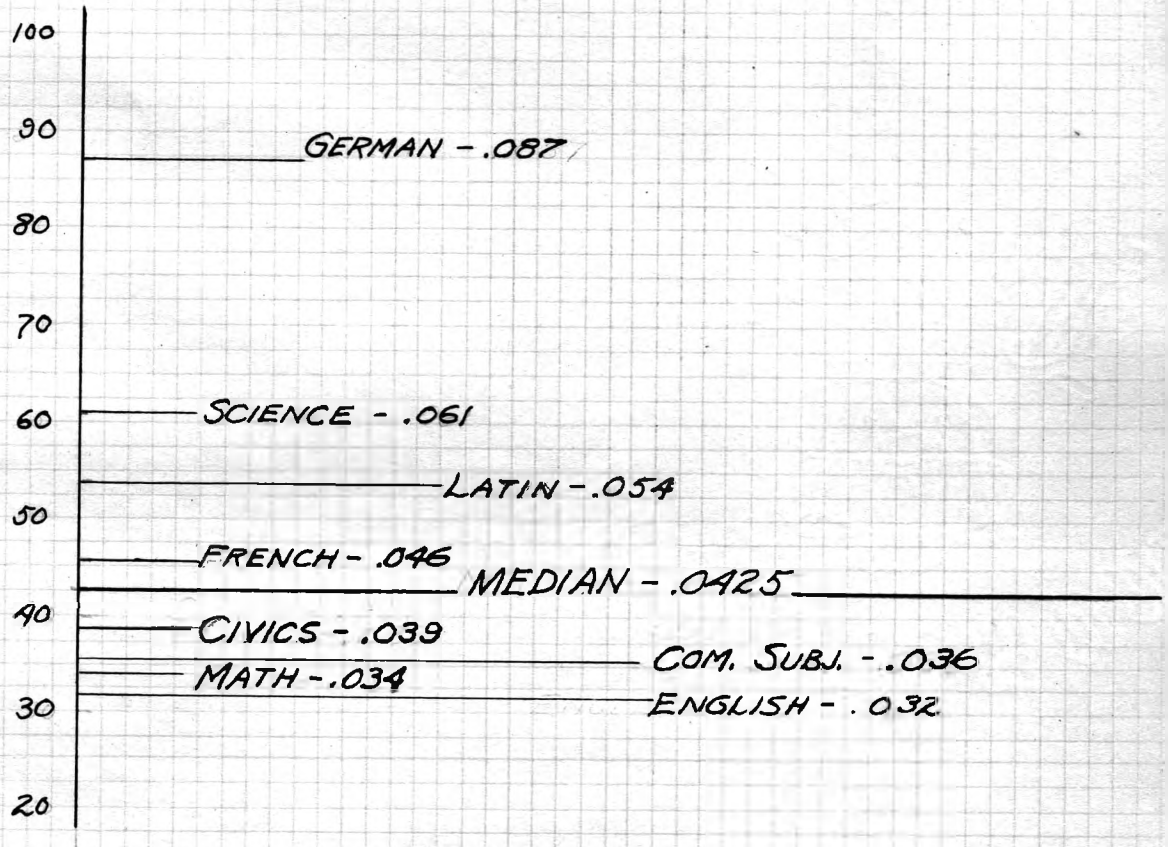

TABLE VIII WATERVILLE

COST PER STUDENT HOUR: MEDIAN - .0425
ZONE OF SAFETY - .035 - .057

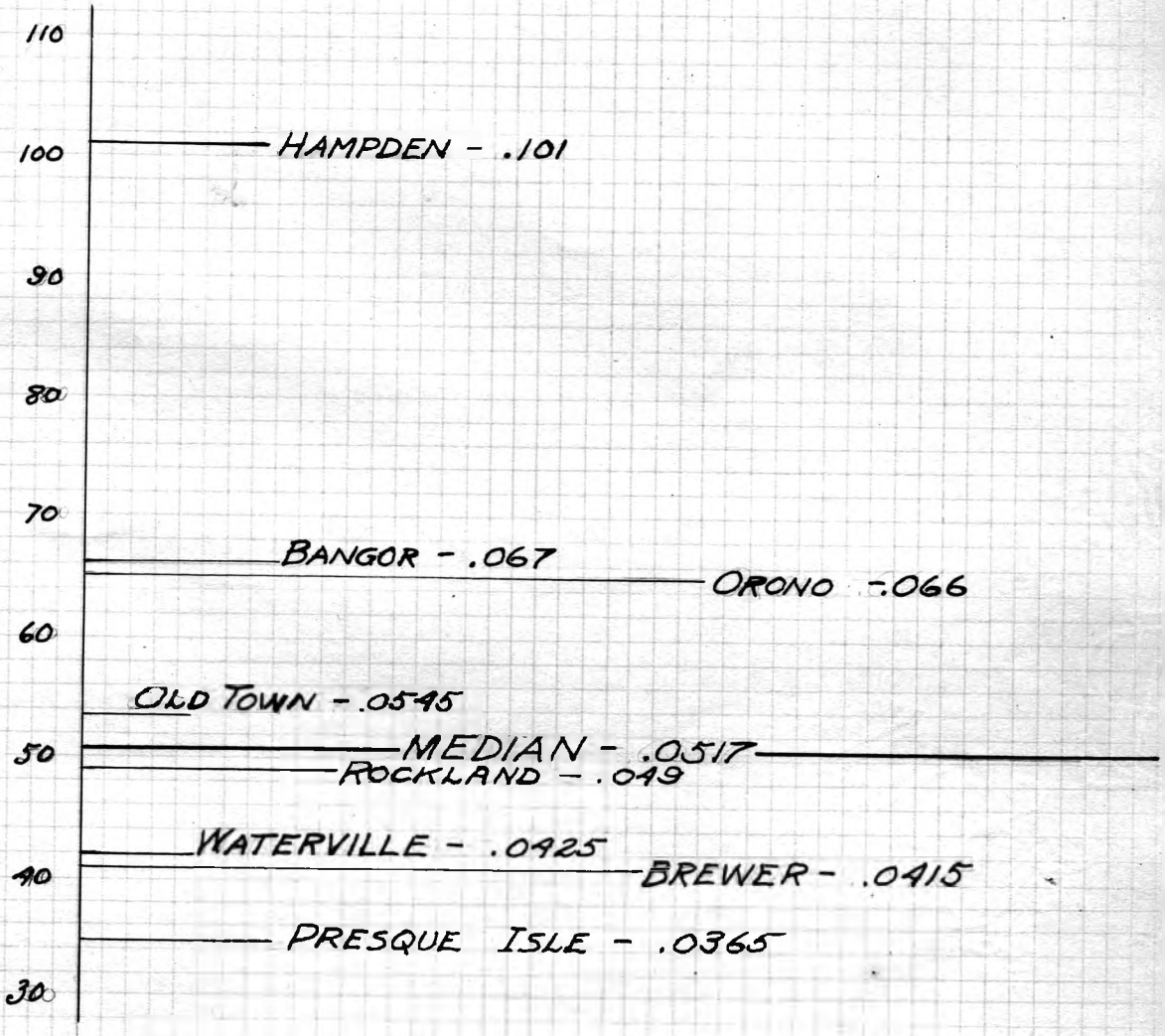

TABLE IX COMPARISON OF MEDIANS OF THE COSTS OF ALL SUBJECTS BY STUDENT HOUR IN EIGHT TOWNS

MEDIAN - .0517 ZONE OF SAFETY .0420 - .0665

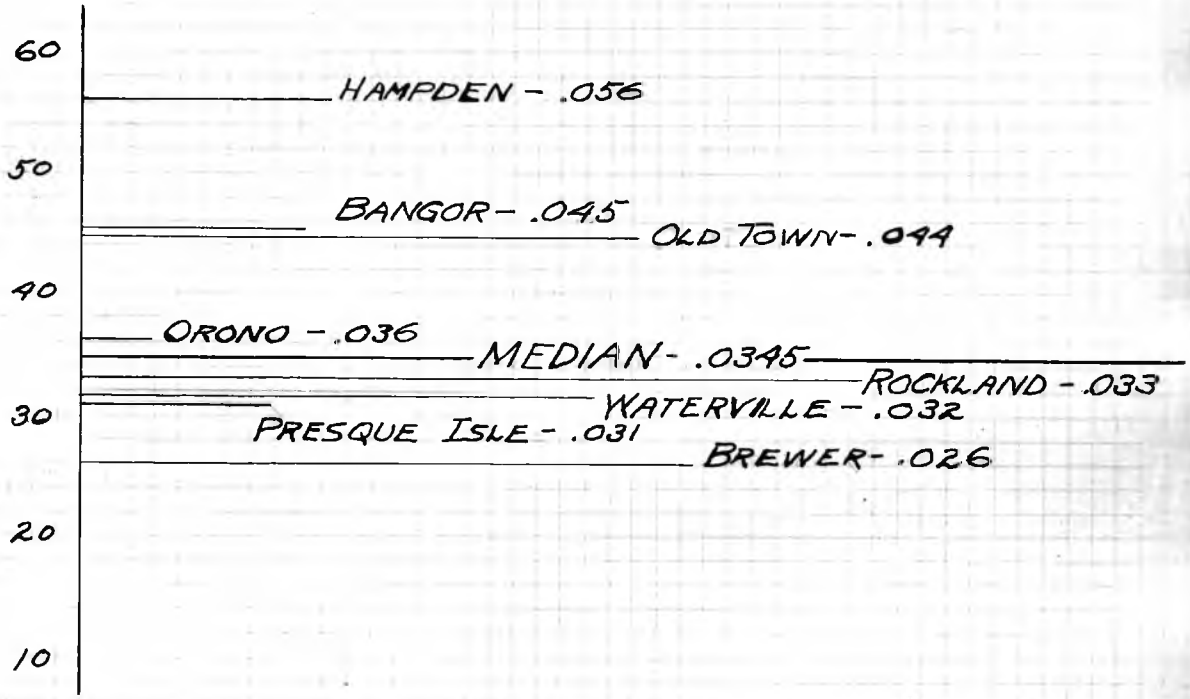

TABLE X

ENGLISH

COST PER STUDENT HOUR: MEDIAN - .0345

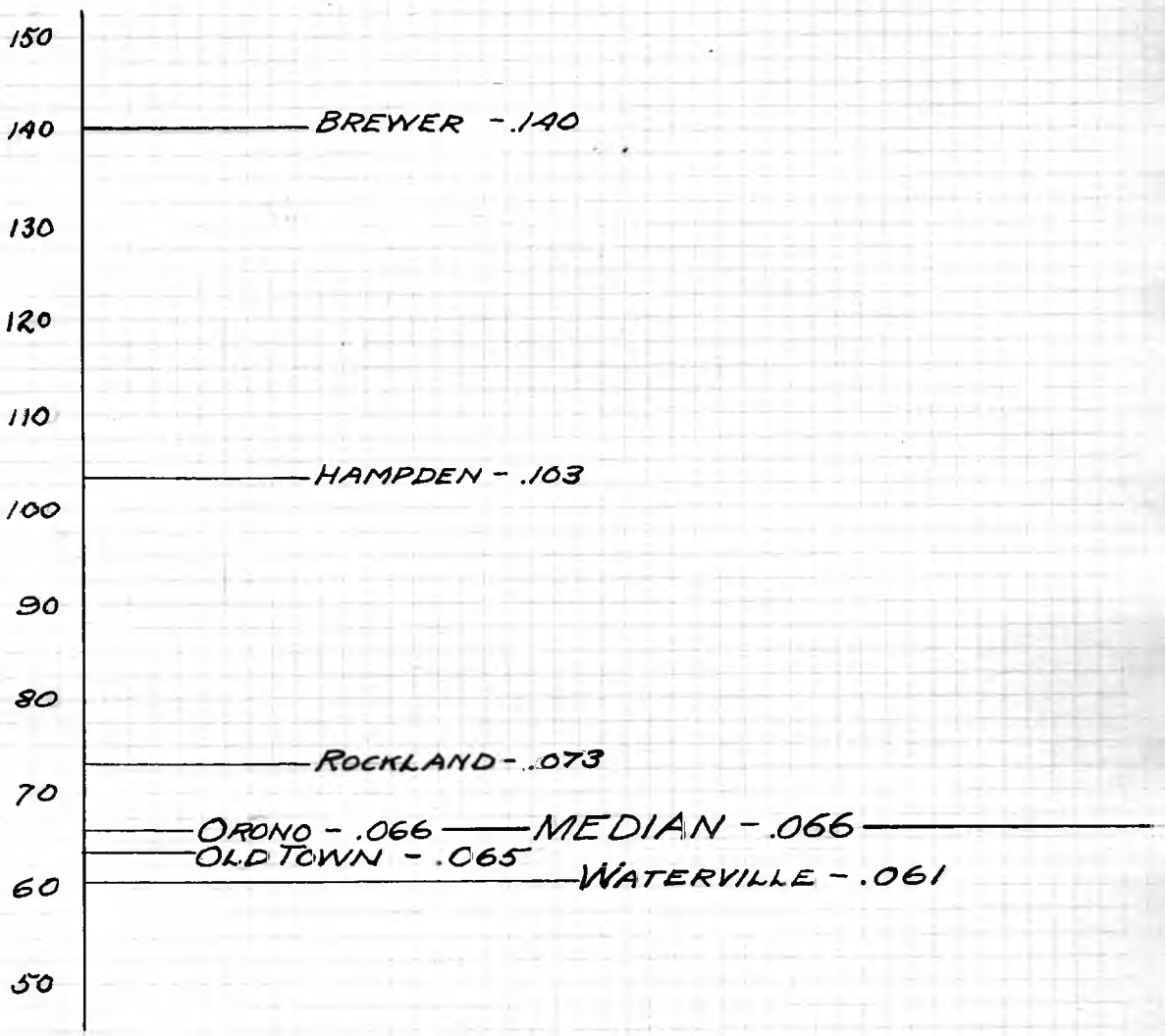

TABLE XI

SCIENCE

COST PER STUDENT HOUR: MEDIAN - .066

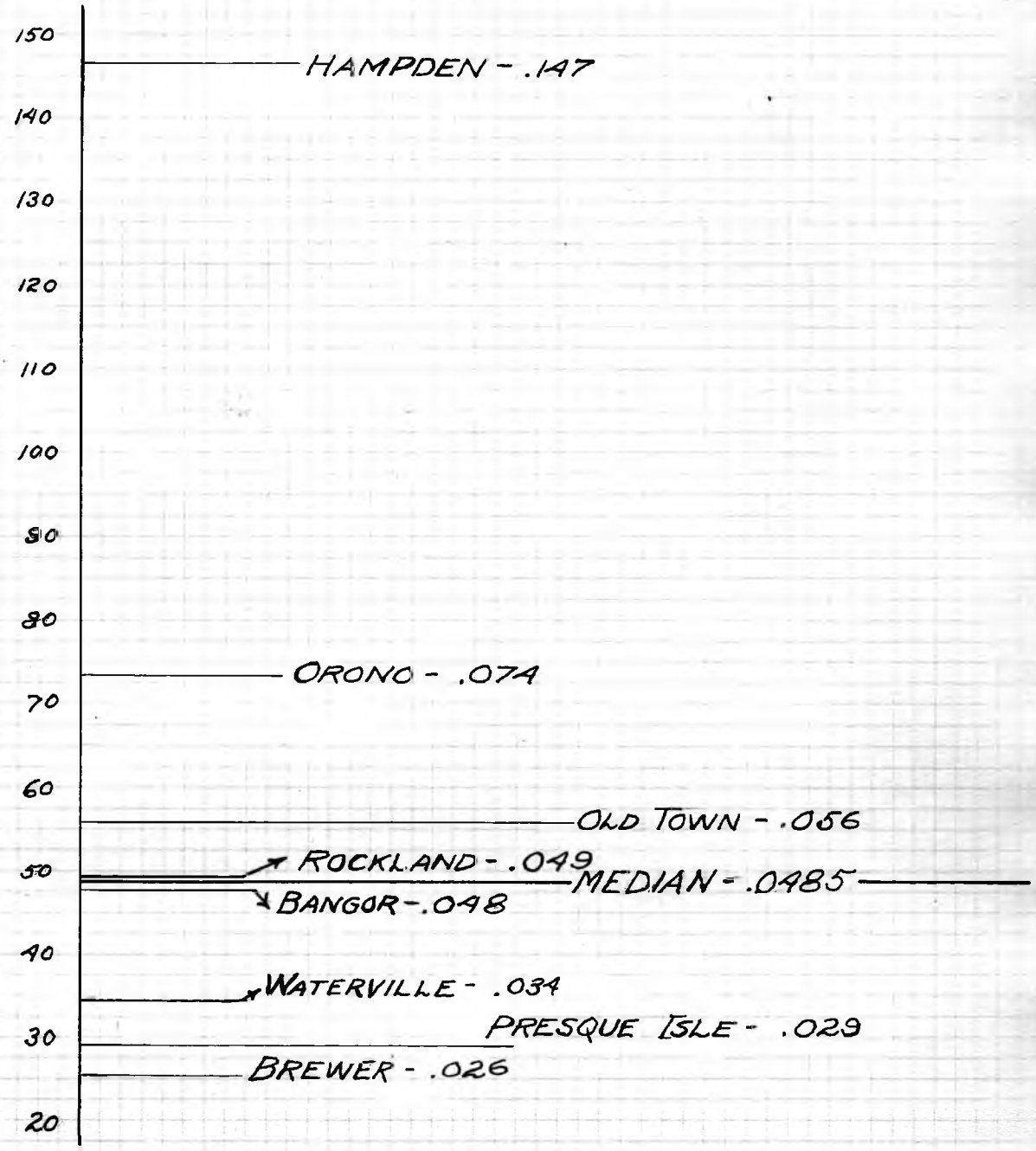

TABLE XIII MATHEMATICS

COST PER STUDENT HOUR: MEDIAN - .0485 .

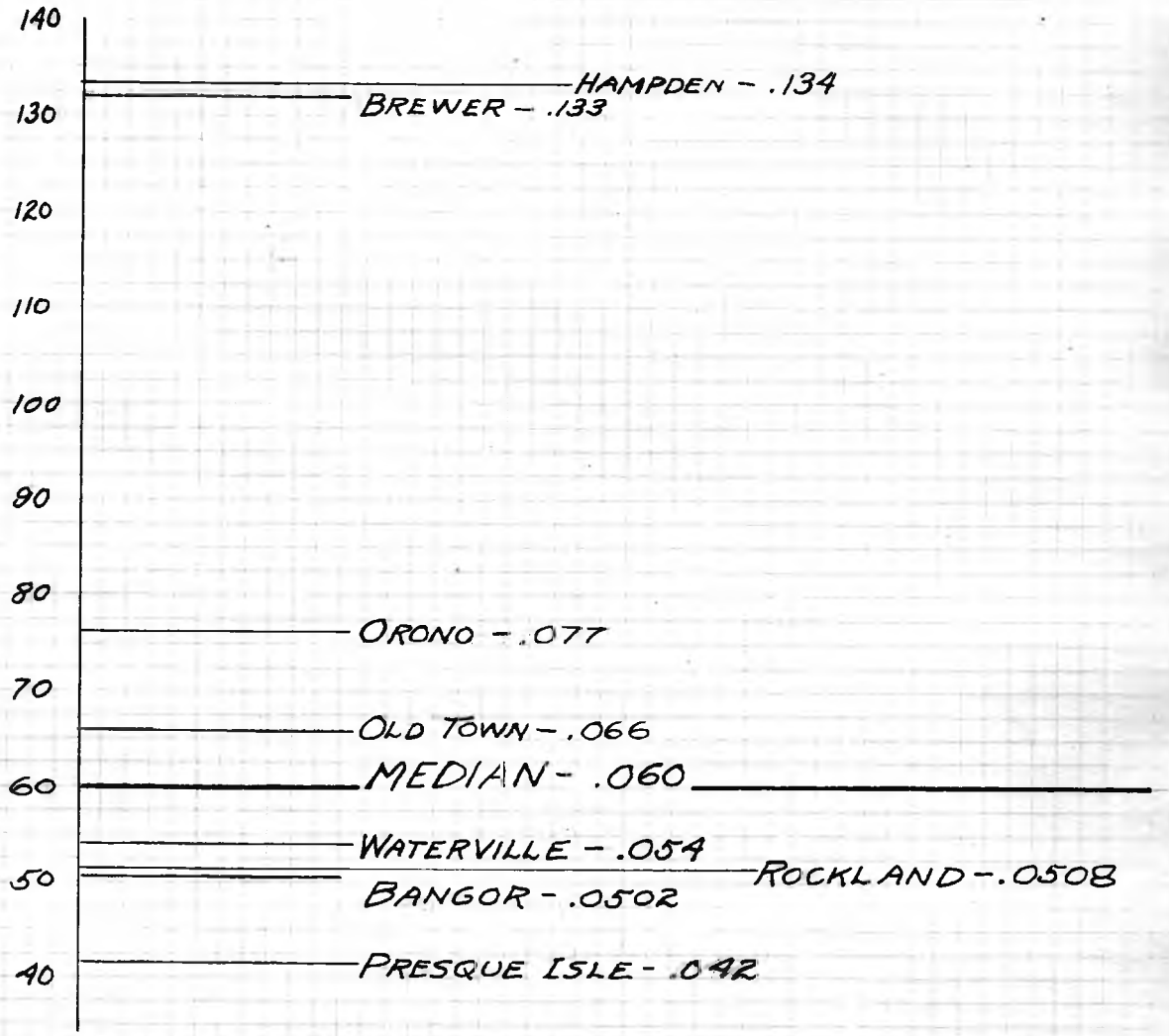

TABLE XIV. LATIN

COST PER STUDENT HOUR : MEDIAN – .060

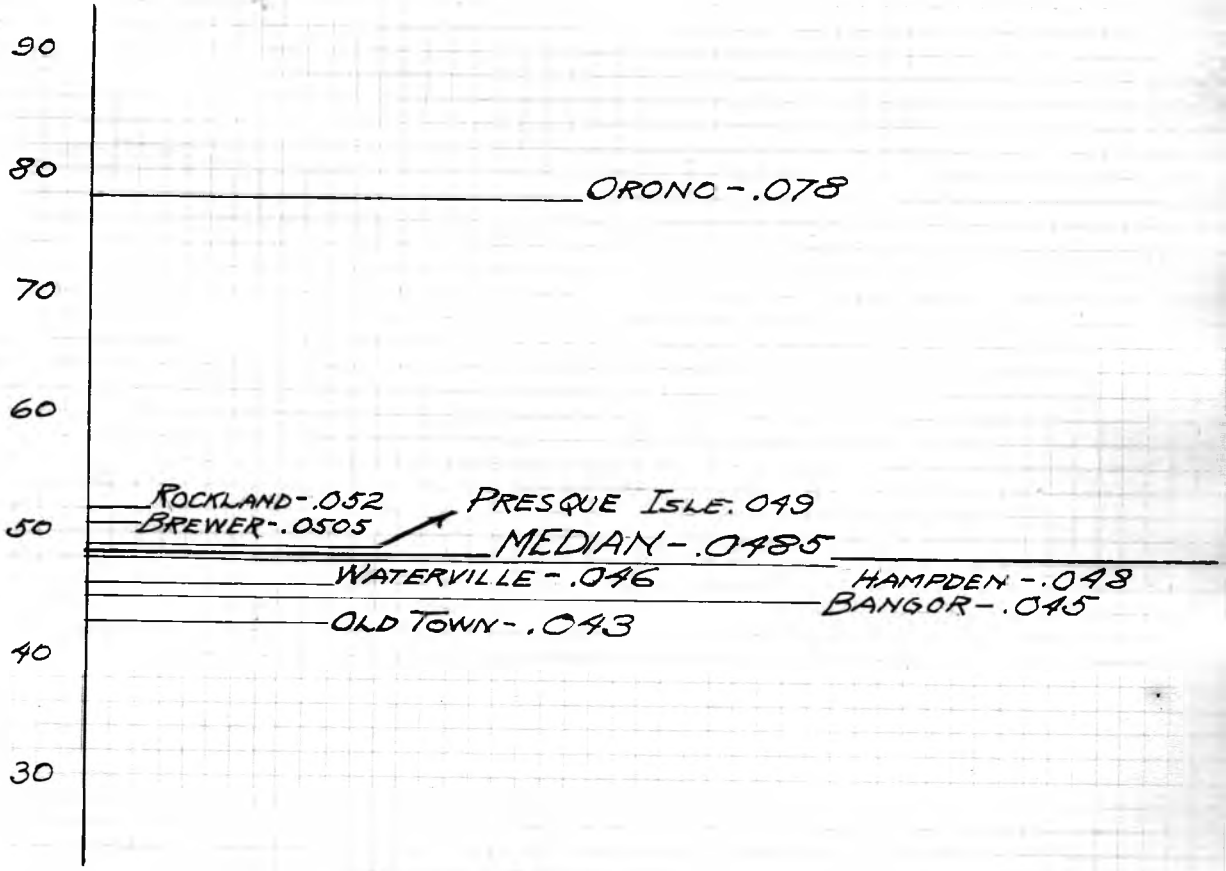

TABLE XV

FRENCH

COST PER STUDENT HOUR: MEDIAN - .0485

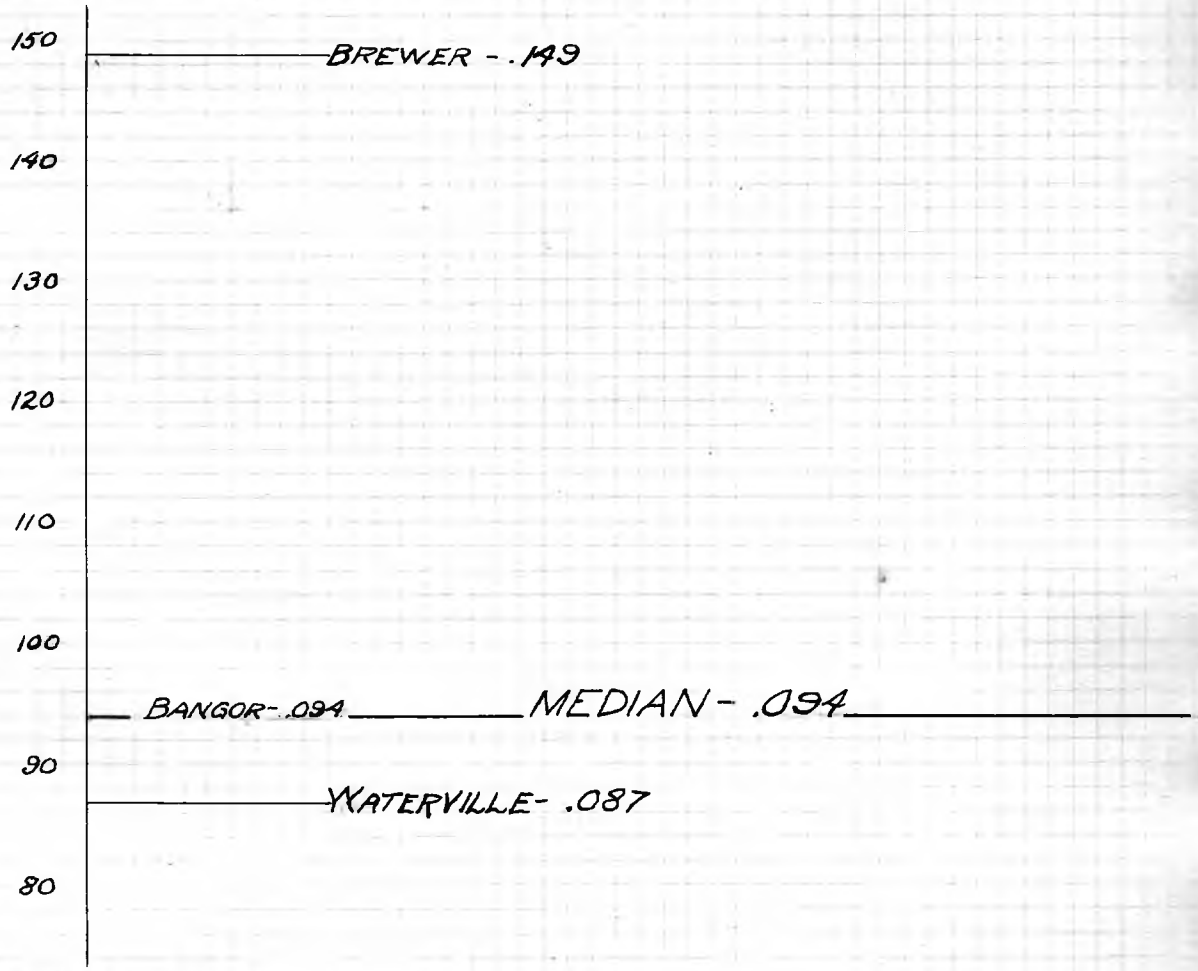

TABLE XVI

GERMAN

COST PER STUDENT HOUR: MEDIAN -.094

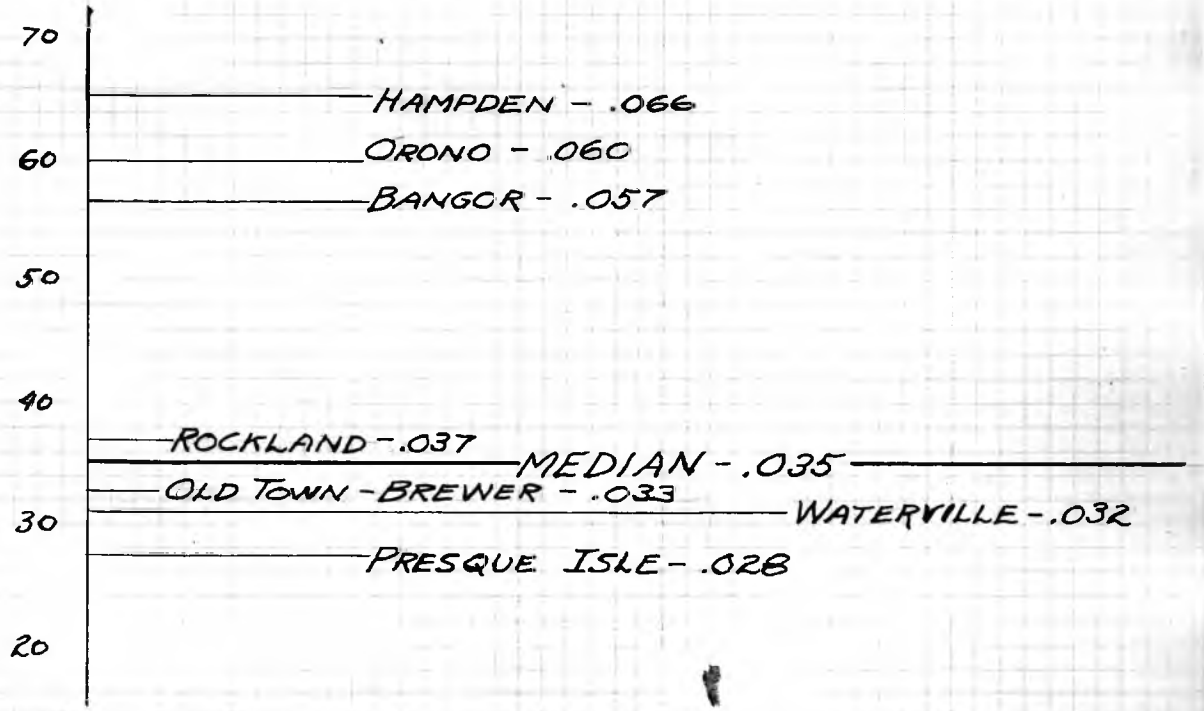

TABLE XVII HISTORY

COST PER STUDENT HOUR: MEDIAN - .035

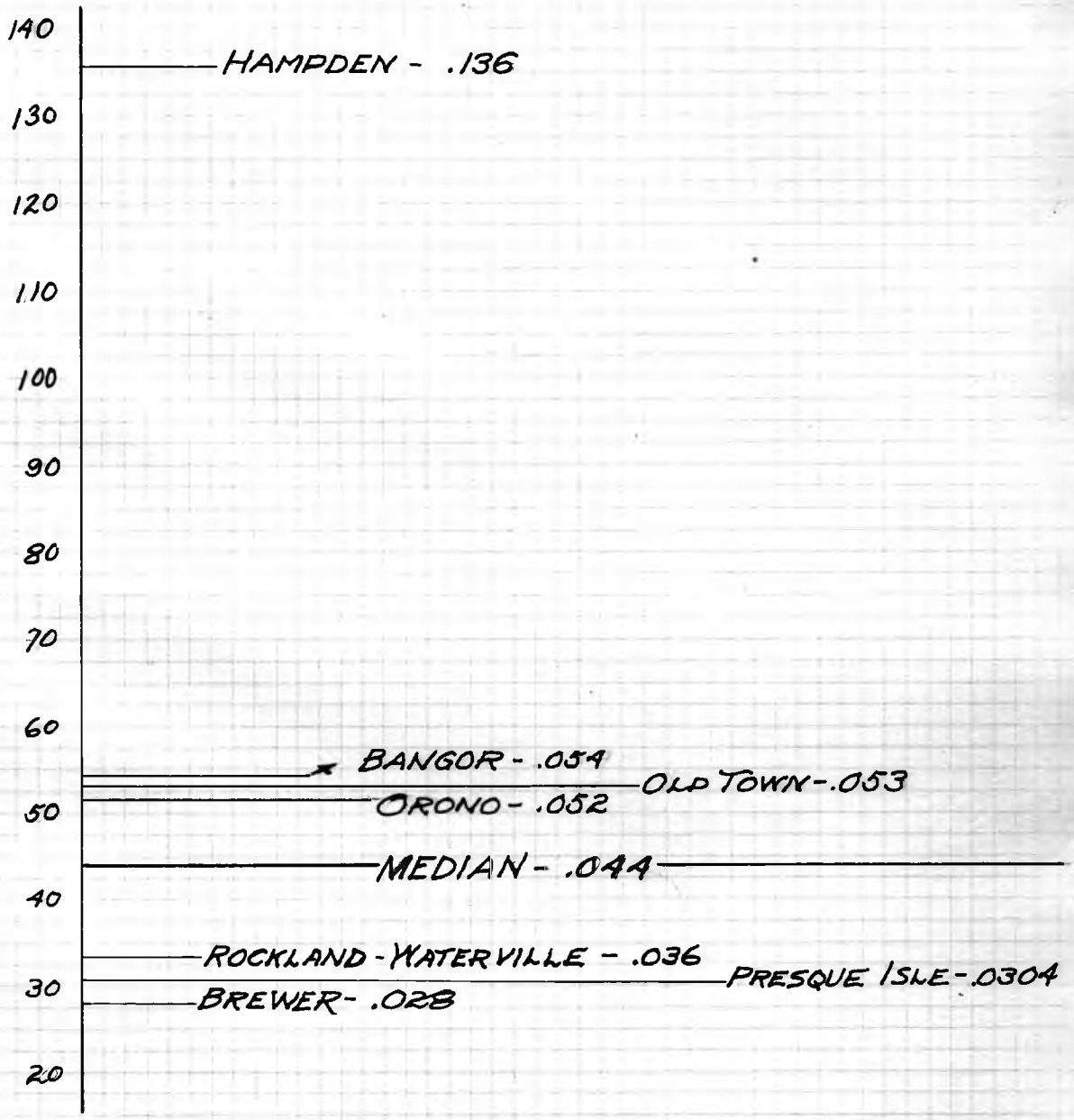

TABLE XVIII COMMERCIAL SUBJECTS

COST PER STUDENT HOUR: MEDIAN - .044

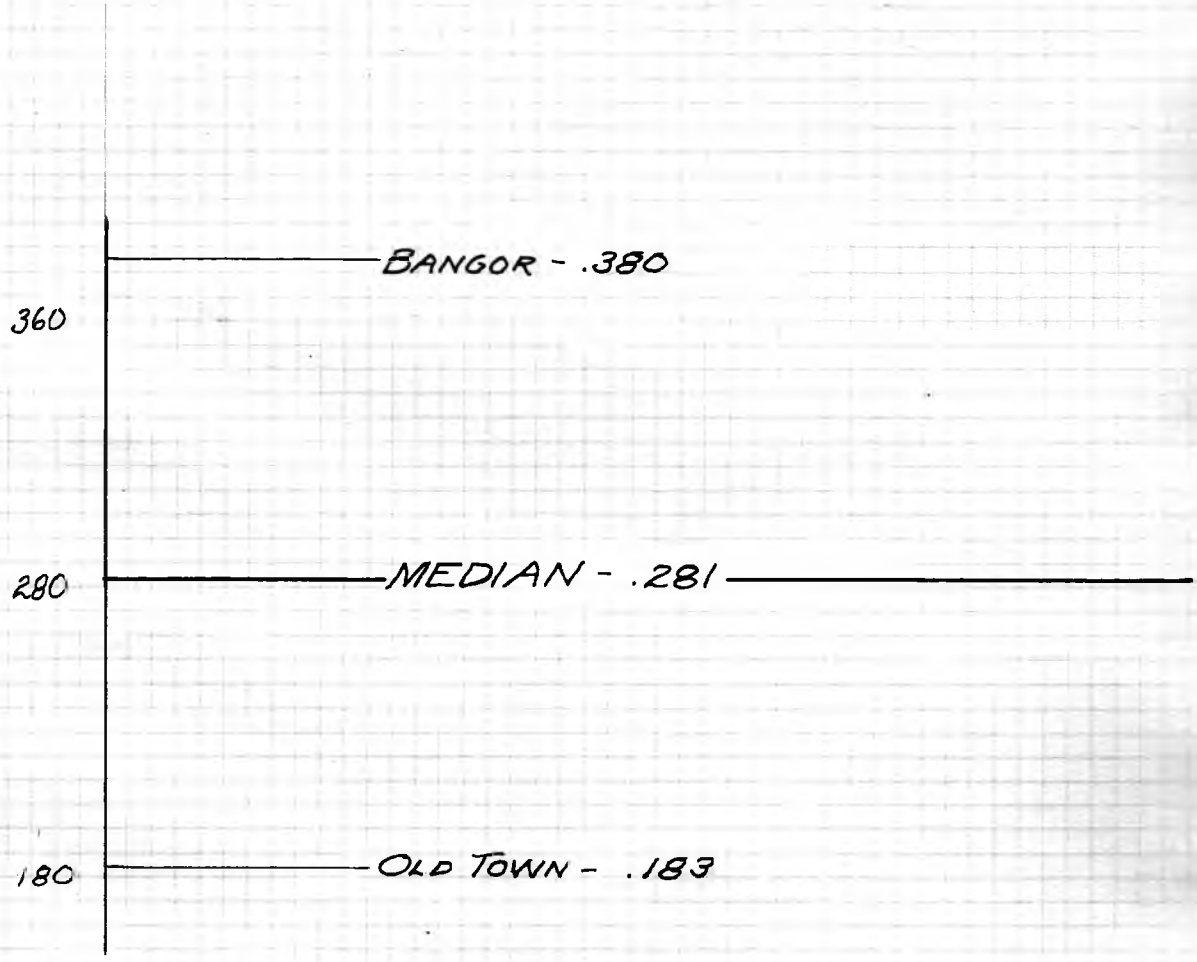

TABLE XIX MANUAL TRAINING

COST PER STUDENT HOUR : MEDIAN - .281

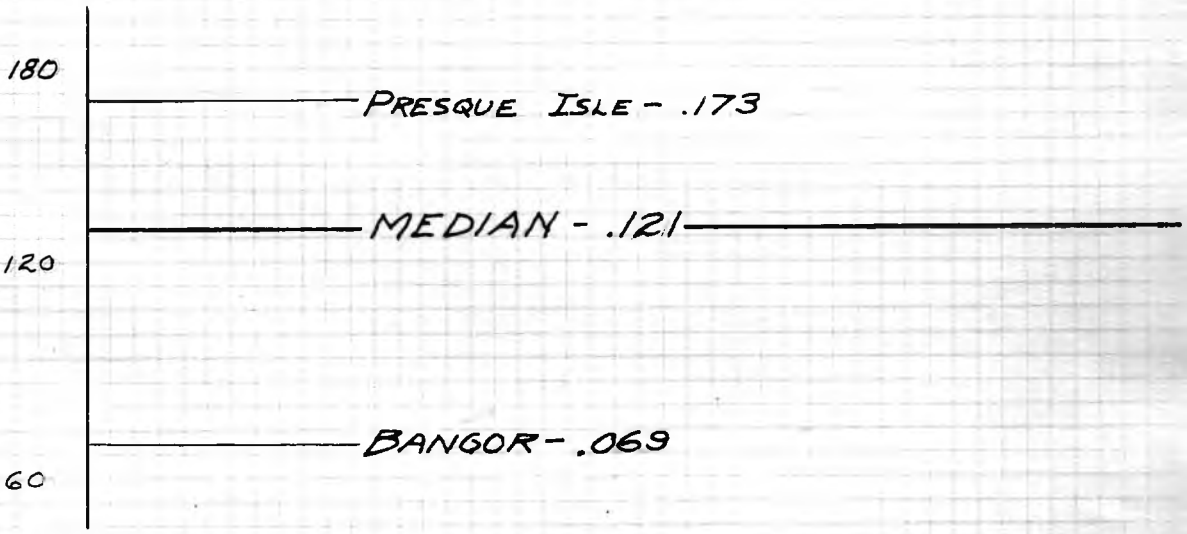

TABLE XX MECHANICAL DRAWING

COST PER STUDENT HOUR: MEDIAN - .121

BREWER

COMPARISON OF NUMBER OF STUDENTS HOURS FOR #1.00

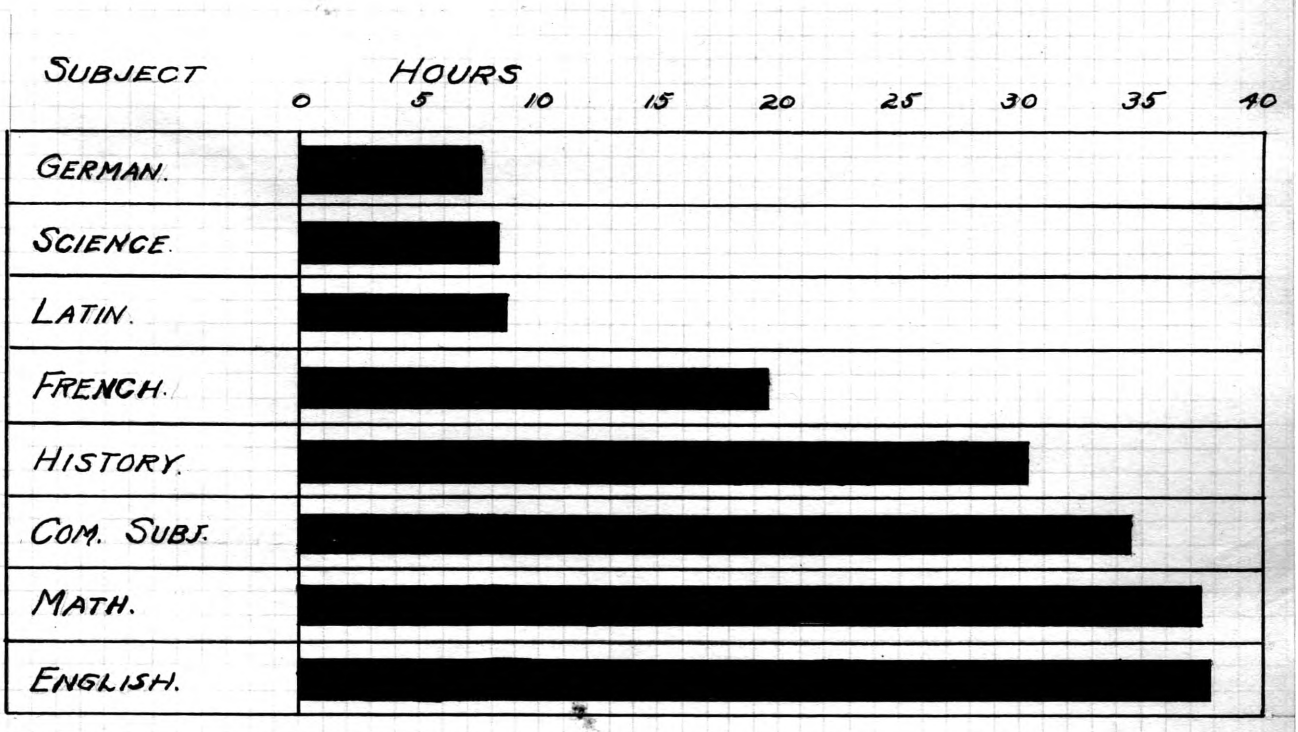

TABLE XXIII

HAMPDEN

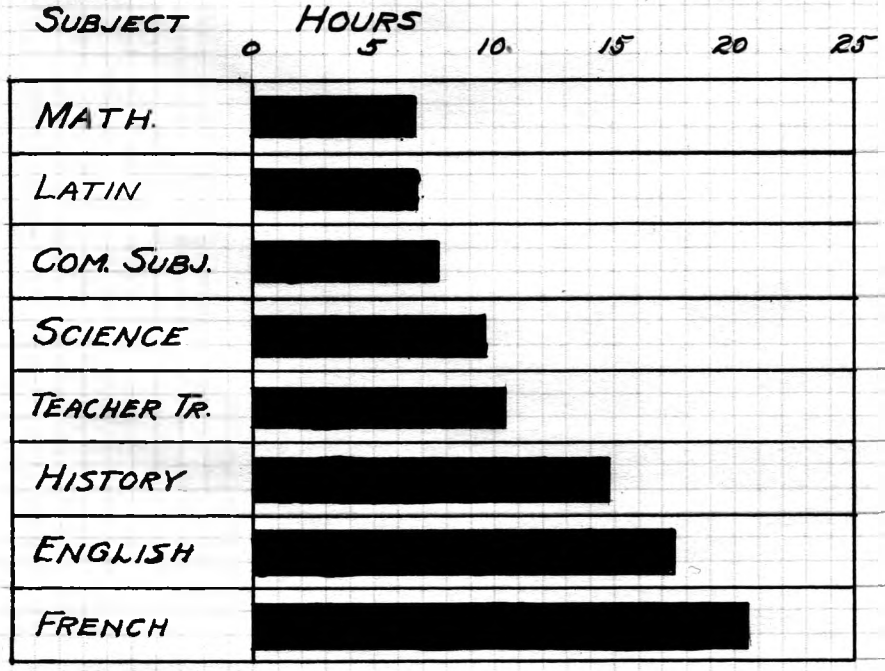

TABLE XXIX

BANGOR

COMPARISON OF NUMBER OF STUDENT HOURS FOR ONE DOLLAR.

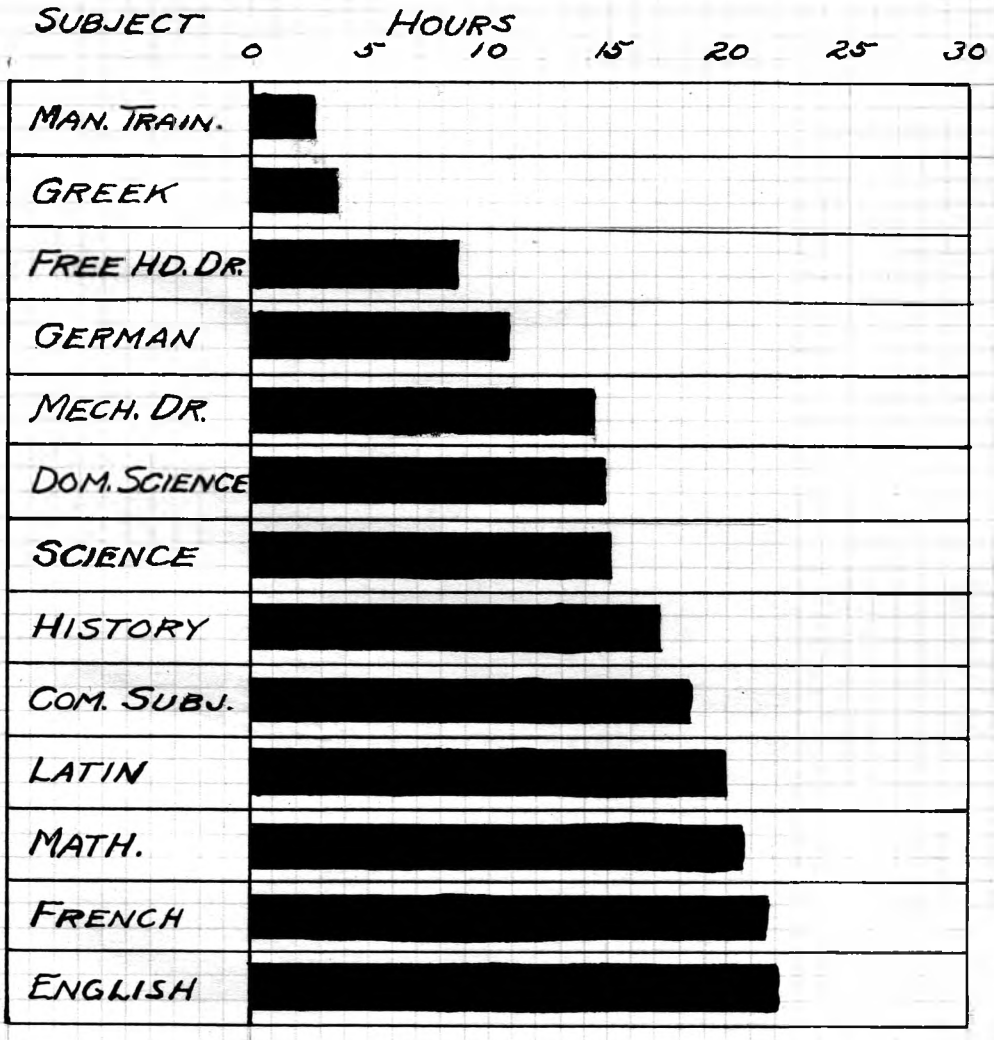

TABLE XXII

ORONO

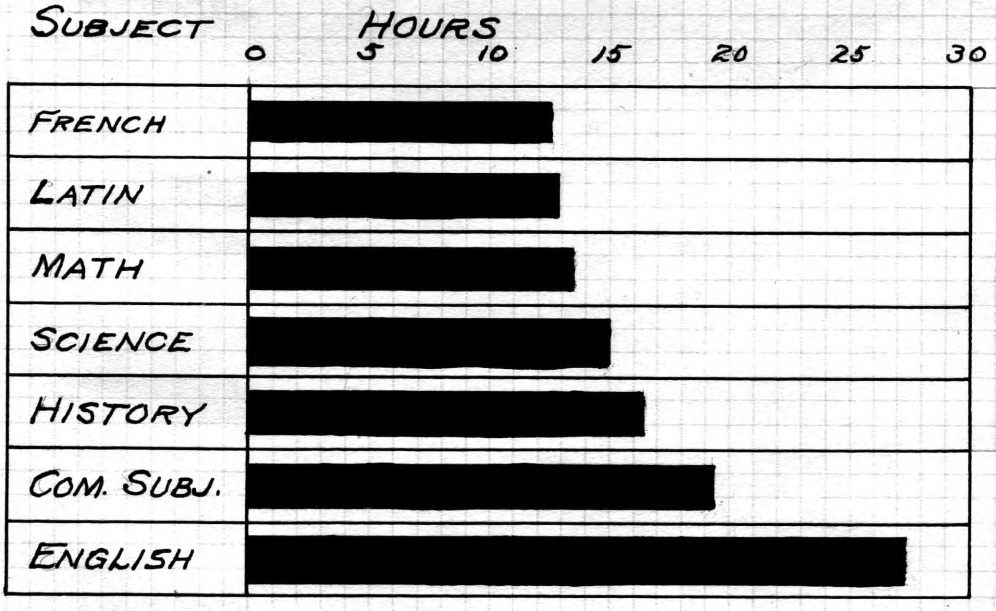

TABLE XXIV

OLD TOWN

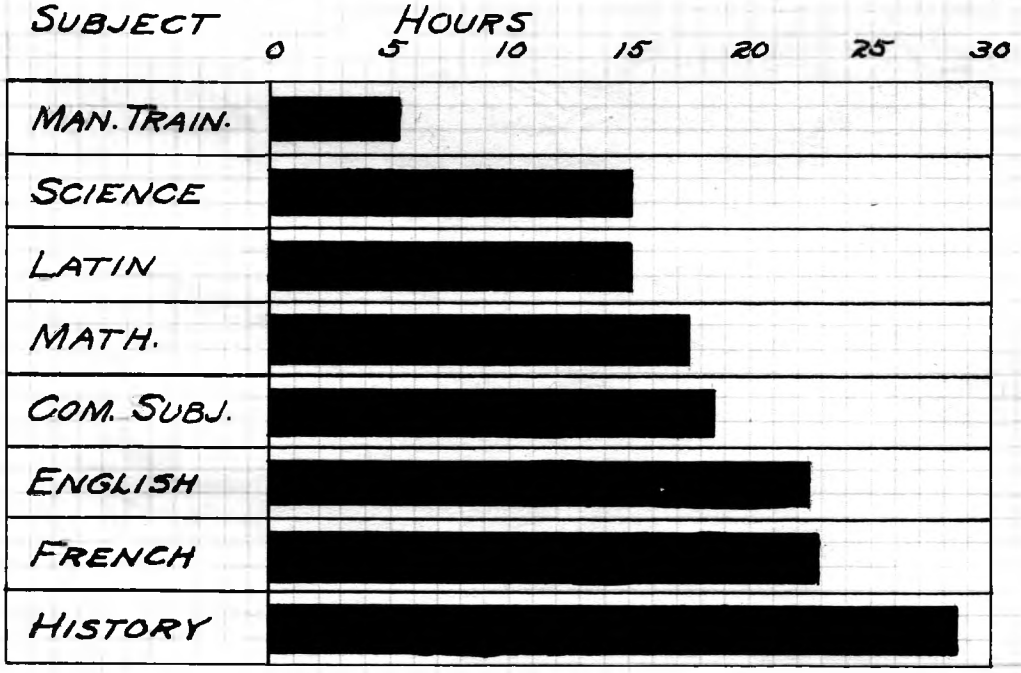

TABLE XXV

ROCKLAND

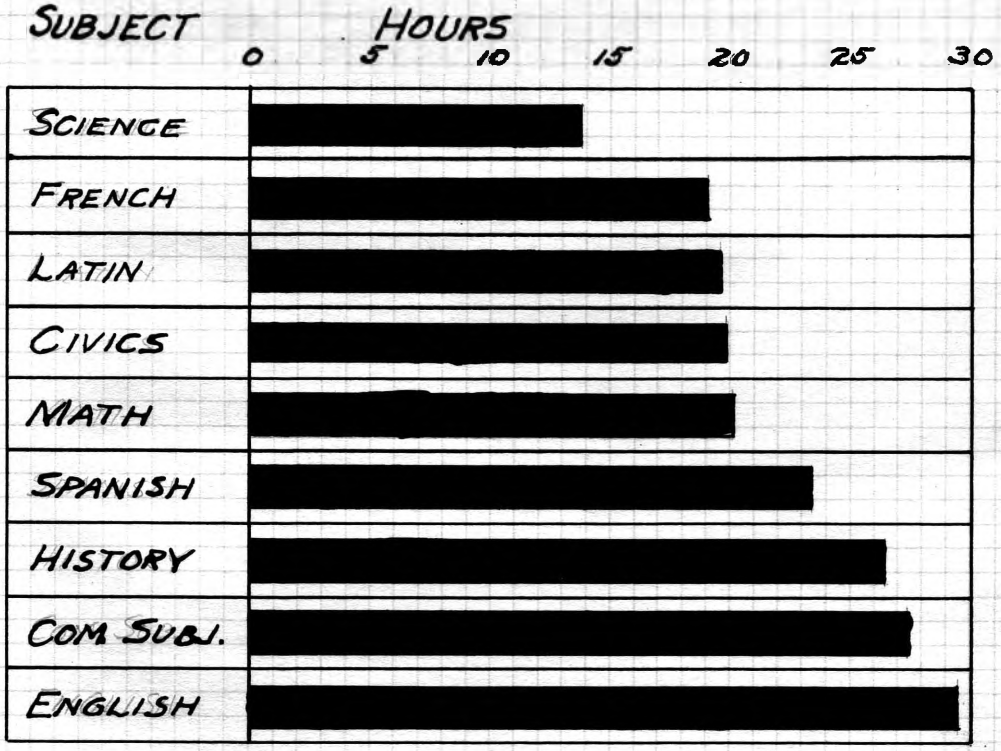

TABLE XXVI

WATERVILLE

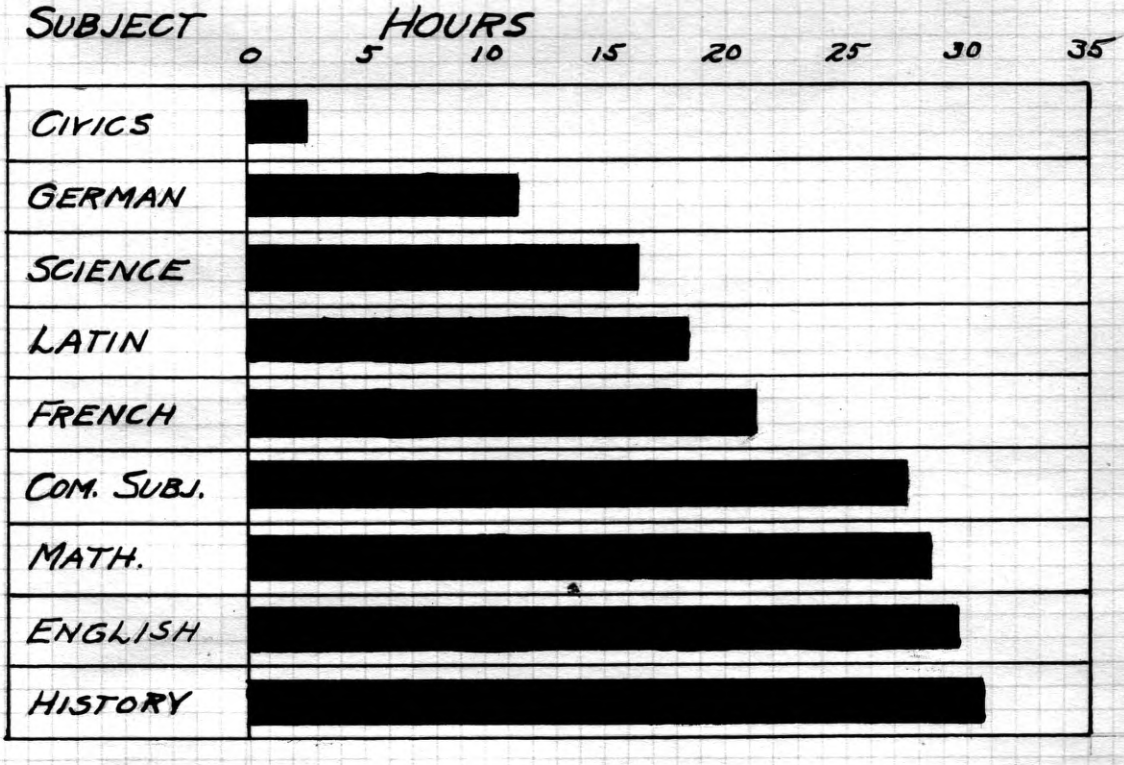

TABLE XXVIII

PRESQUE ISLE

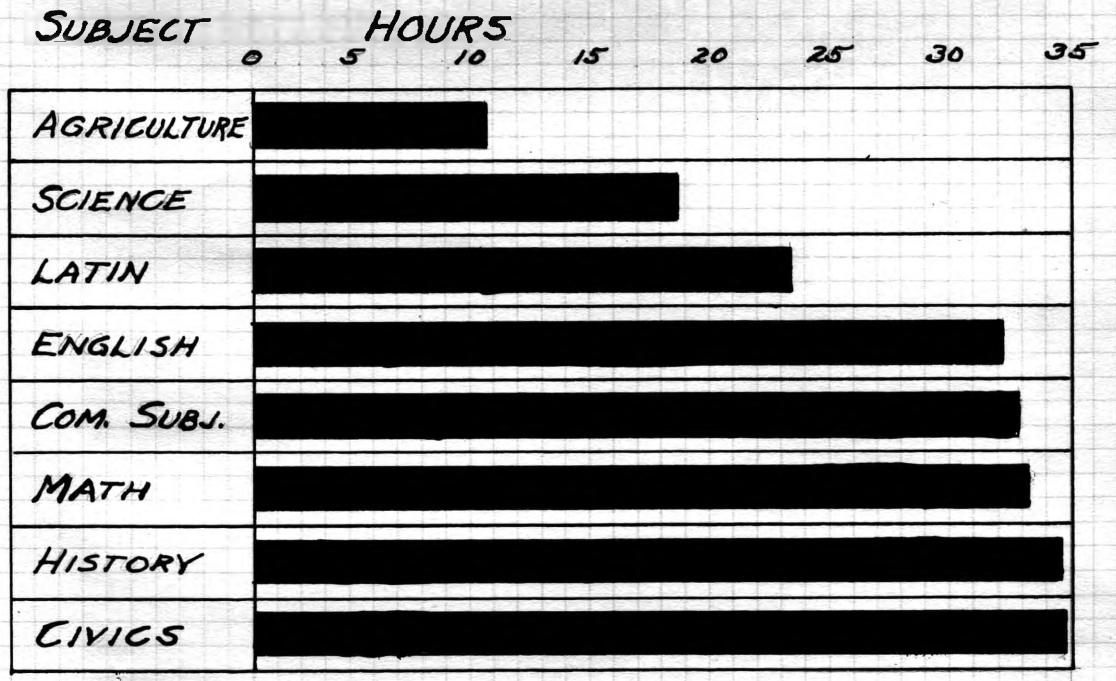

TABLE XXVII

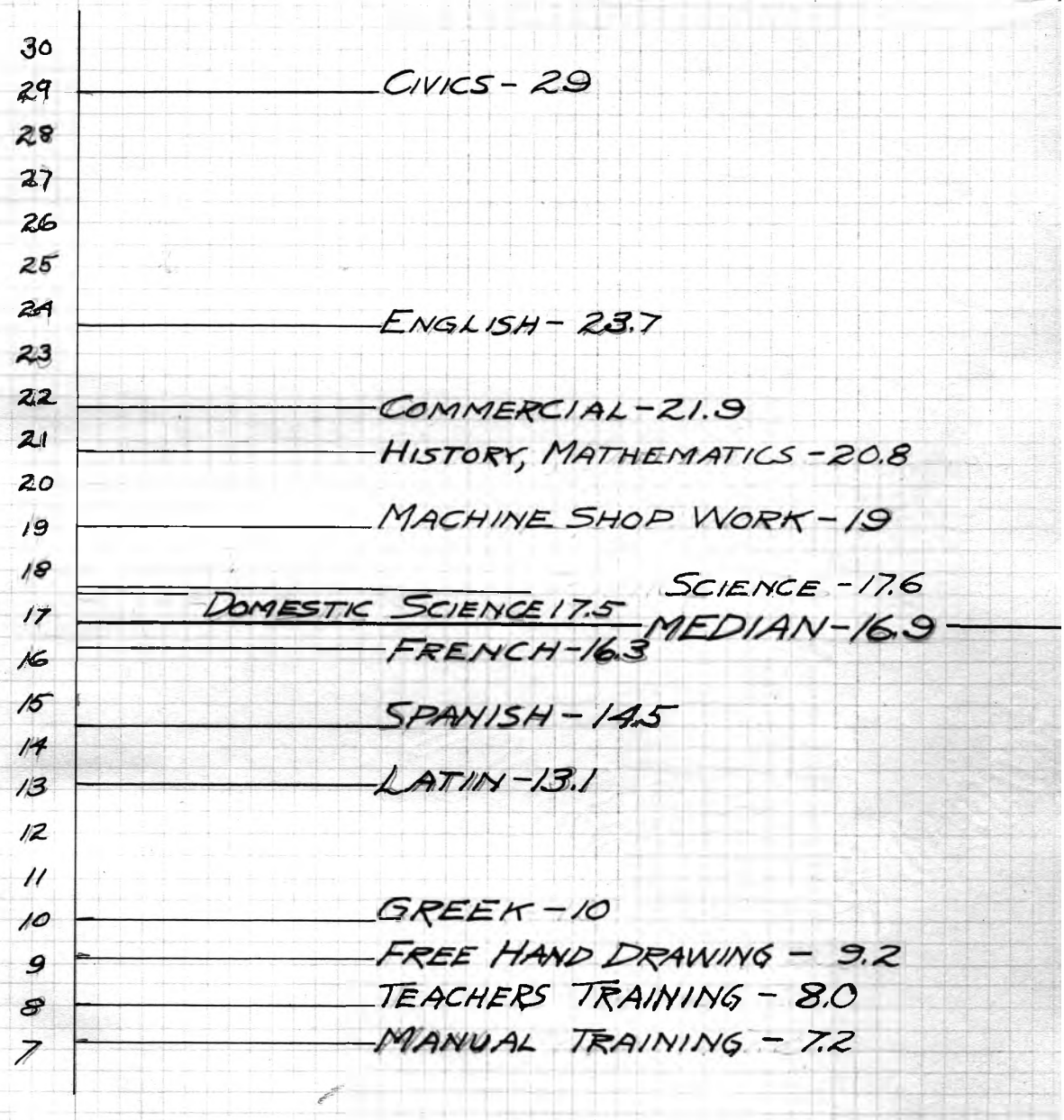

TABLE XXIX

MEDIAN NUMBER OF PUPILS IN CLASS IN ALL SUBJECTS, IN ALL SCHOOLS.

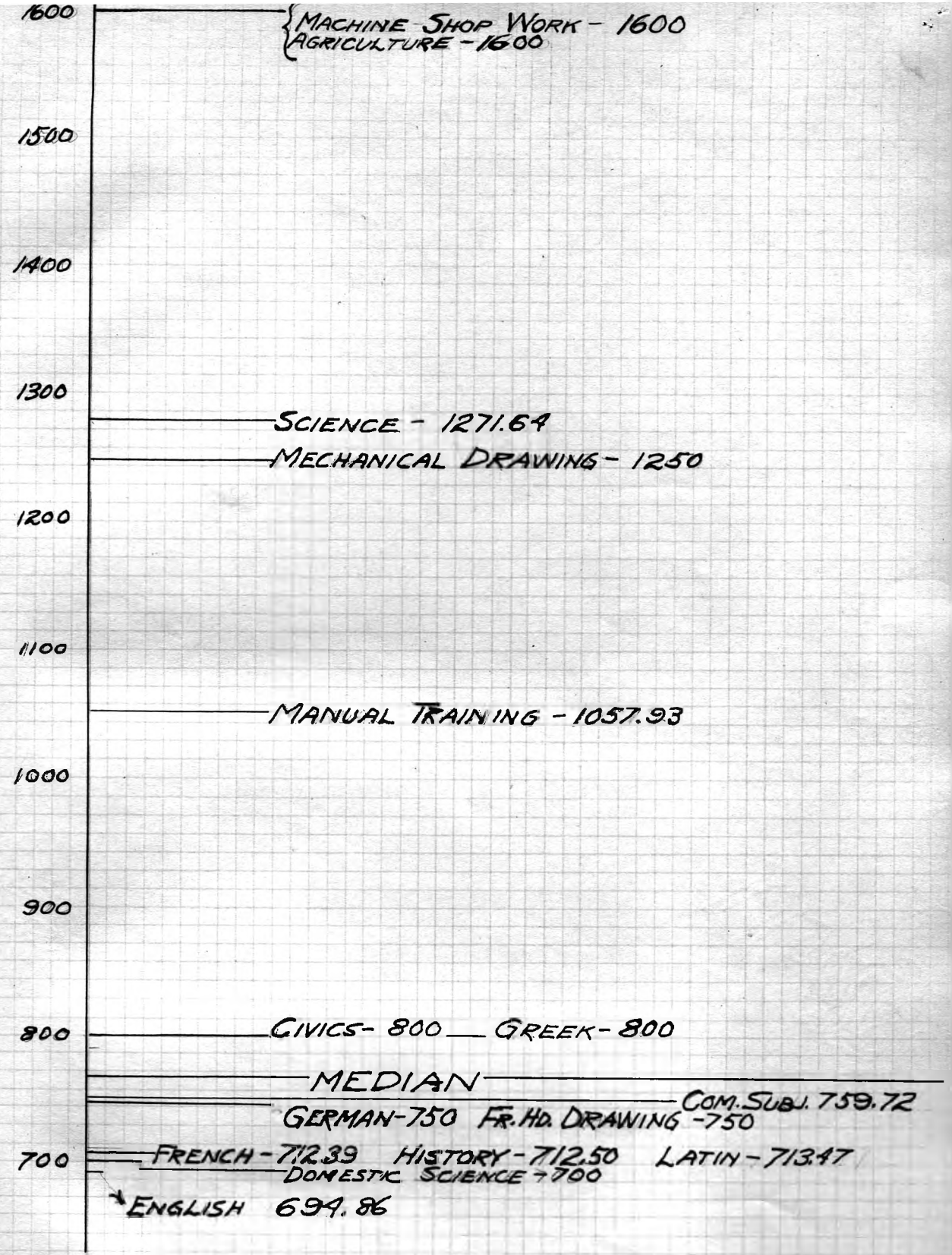

TABLE XXX MEDIAN OF ALL SALARIES, BY ALL SUBJECTS.