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ABSTRACT

General documentation for the Enrollment Projection Model used by the Maryland Council for Higher Education (MCHE) is provided. The manual is directed toward both the potential users of the model as well as others interested in enrollment projections. The first four chapters offer administrators or planners insight into the derivation of the council's enrollment projections. They include: (1) a history of MCHE Enrollment Projection Model usage and reasons for using the current model; (2) an overview of the model; (3) the logistic curve used in the model; and (4) a description of the calculation procedure. The fifth chapter, on procedures for running the model, requires a basic understanding of computers and familiarity with the Univac 1108 system. (Author/LBH)

Enrollment Projection Model

$a + bx = c$

$\left[\frac{k_2 - k_1}{P(x) - k_1} - 1 \right]$

$$P(x) = k_1 + \frac{K_2 - K_1}{1 + C^{a+bx}}$$

$$b = \frac{N \Sigma(xy) - \Sigma x \Sigma y}{N \Sigma x^2 - (\Sigma x)^2}$$

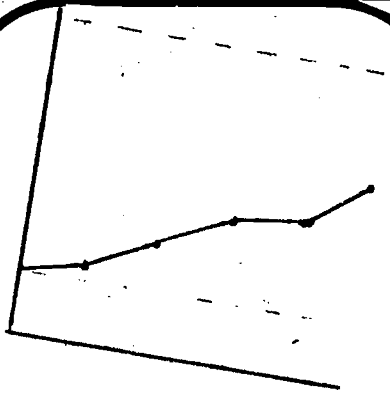
$$a + bx = c$$

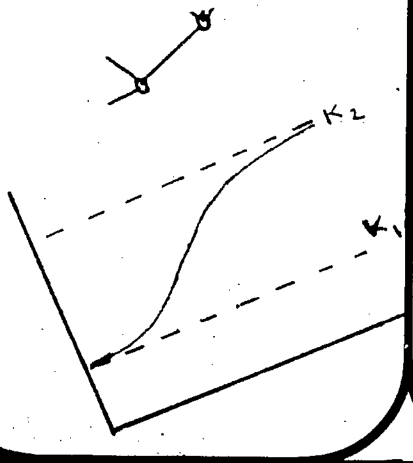
where

$$c = \ln \left[\frac{k_2 - k_1}{P(x) - k_1} - 1 \right]$$

$$P(x) = k_1 + \frac{k_2 - k_1}{1 + C^{a+bx}}$$

$$b = \frac{N \Sigma(xy) - \Sigma x \Sigma y}{N \Sigma x^2 - (\Sigma x)^2}$$





YEAR	DX	HIGH SCHOOL GRADS
1955	19	17297.
1956	20	19129.
1957	21	19534.
1958	22	20969.
1959	23	23345.
1960	24	27215.
1961	25	30716.
1962	26	30271.
1963	27	32554.
1964	28	39099.
1965	29	47154.
1966	30	47223.
1967	31	46843.
1968	32	48683.
1969	33	50845.
1970	34	52843.
1971	35	58897.
1972	36	59336.
1973	37	59472.
1974	38	61611.
1975	39	64428.

Maryland Council
For Higher Education

MARYLAND COUNCIL FOR HIGHER EDUCATION

ENROLLMENT PROJECTION MODEL

May 1976

Maryland Council for Higher Education
93 Main Street
Annapolis, Maryland 21401

Prepared by B. Kerry Gustafson and Stephen R. Hample

STATE OF MARYLAND
MARYLAND COUNCIL FOR HIGHER EDUCATION

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INTRODUCTION

The purpose of this manual is to provide general documentation for the Enrollment Projection Model used by the Maryland Council for Higher Education. It is directed toward both the potential users of the model as well as others interested in enrollment projections. The first four chapters of this manual should provide educational administrators or planners with a better insight into the derivation of the Council's enrollment projections. The individuals responsible for actually running and updating the model should have a basic understanding of computers and be familiar with the Univac 1108 system in order to proceed from the instructions in Chapter 5.

CHAPTER I

HISTORY OF MCHE ENROLLMENT PROJECTION MODEL USAGE AND REASONS FOR USING THE CURRENT MODEL

The Maryland Council for Higher Education was originally established as the Maryland Advisory Council in 1964. Directed to aid in the planning of higher education, the Council realized that such planning could not be successfully accomplished without knowing what kind of growth in enrollments was to be expected; and hence, one of the first concerns of the Council was toward establishing a means of reliably predicting future enrollments. A task force on enrollments was established which developed projections used in the Council's first Master Plan for Higher Education in Maryland. However, the numerous factors affecting enrollment growth presented a distinct difficulty and pointed to the need for a computerized model.

The first model used by the Council was developed by Peat, Marwick, Mitchell and Company in 1968. It projected future enrollments by a complex process that depended upon a number of factors including births; incomes; and elementary, secondary, and college enrollments by grade or year in school. In attempting to use the model, the large number of data base revisions required annually resulted in significant delays and hindered the editing of preliminary data supplied to MCHE. Additionally, the cost of making trial runs with the model proved to be excessive.

By 1969 the Council had had the experience to know the advantages and disadvantages of various projection techniques. It contracted with Murray Pfefferman, an independent contractor, to utilize existing technology in use at the Federal level in developing a computerized model. In undertaking this second attempt, several criteria were established for the State of Maryland. The model was to be fairly simple to understand and operate, require data readily obtainable from State and Federal sources, and, although based primarily on the continuation of past trends, permit modifications to be made to those trends by the user to reflect changes in policy or changes in observed characteristics of students.

The model which resulted from this effort has been in use since 1969. It has proven to be an extremely useful and reliable tool. Some modifications were made in 1973 by Dr. Sheldon Knorr and Mr. Kerry Gustafson of the Council staff to incorporate new data available at the State level. However, the basic technology developed in 1969 model was left unchanged.

CHAPTER II

AN OVERVIEW OF THE MODEL

The model as currently constructed utilizes numerous probabilities or ratios and projects these ratios into the future using a logistic curve which allows a trend to continue until it is smoothed into a specified upper or lower limit. Two examples of probabilities which are projected in this manner are the probability of a 10th grader graduating three years later and the probability of an enrolled college student being in the public sector. Each of these is projected based on changes in the ratios over a period of years. These ratios are then applied against such data elements as the current or projected number of tenth graders or college students.

Throughout this description, the terms ratio and probability are used interchangeably. While a discussion of probabilities is more intuitive, certain detailed points may cause the reader some confusion. If this occurs, the consideration of simple ratios between different sets of numbers is suggested.

Once appropriate ratios have been determined, this method has the advantage of being quite straightforward in the calculations. The curve smoothing and projection of the ratios in the MCHE model add a vital piece of sophistication which may be missing in other models of this type.

Although, like most higher education projection models, the Council model considers high school graduates, it also places a heavy emphasis on the number of 10th graders. It is felt this provides a three year lead time, thereby permitting the model user to anticipate many possible trend changes three years before students show up on campus, without the effort of following enrollments in all grades.

Finally, the model utilizes a global approach in that it projects the total college enrollment for the State and then distributes the total number to the segments and levels. It is felt this method is superior to projecting individual institutions and then summing them because the total number of students available is probably somewhat fixed. The total number is based on births, migration, high school graduation, and college attendance rates; while the segmental distribution is more flexible and depends on such variable factors as recruiting procedures and public policy as related to institutional size and offerings.

The third chapter contains a detailed discussion of the logistic curve used in the model. Although frequent references are made to this curve fitting process, the discussion is intended to be self-contained and may be skipped by the general reader. The fourth chapter steps through the calculations made by the model, while the fifth chapter consists of technical notes for use in running the model.

CHAPTER III

THE LOGISTIC CURVE USED IN THE MODEL

The basic technology employed in the model is the determination of appropriate predictive ratios or probabilities and then projecting these probabilities into the future. This projection is done by a logistic curve of the type

$$P(x) = k_1 + \frac{k_2 - k_1}{1 + e^{a + bx}}$$

fitted to the historically recorded ratios with estimated upper and lower asymptotes.

For each ratio to be projected, the constants k_1 and k_2 are entered to serve as upper and lower limits. Their effect can be illustrated by considering the following limits, assuming in this example that b is less than zero:

As x increases, the value of P(x) also increases, but is bounded above by k_2:

$$\lim_{x \to +\infty} P(x) = \lim_{x \to +\infty} k_1 + \frac{k_2 - k_1}{1 + e^{a + bx}}$$

$$= k_1 + \frac{k_2 - k_1}{1 + 0}$$

, since (a+bx) eventually becomes a very large negative $(b < 0)$ number and $e^{(a+bx)}$ becomes nearly zero. Recall that $e \approx 2.718$ and that

$$e^{-1} = \frac{1}{e} = \frac{1}{2.718} = .3679$$

$$e^{-2} = \frac{1}{e^2} = \frac{1}{7.389} = .1353$$

$$e^{-3} = \frac{1}{e^3} = \frac{1}{20.08} = .0499$$

$$\vdots$$

$$= k_1 + k_2 - k_1$$

$$= k_2$$

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As x decreases, the value of P(x) also decreases, but is bounded below by k_1:

$$\lim_{x \to -\infty} P(x) = \lim_{x \to -\infty} k_1 + \frac{k_2 - k_1}{1 + e^{a + bx}}$$

$$= k_1 + \frac{k_2 - k_1}{1 + (\text{infinity})},$$

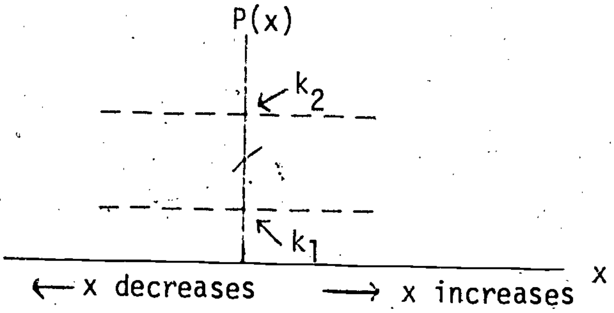
since with both b and x negative, (a + bx) eventually becomes a very large positive number and $e^{a + bx}$ also becomes very large, increasing without limit.

$$= k_1 + 0,$$

since the numerator is fixed while the denominator becomes infinitely large

$$= k_1$$

Graphically, this becomes:



After the asymptotes or limits, denoted by k_1 and k_2, are fixed, the exact shape of the curve is dependent upon the points through which it is expected to pass (or to nearly pass). Consideration of these data points determines the values for a and b which establish the exact shape of the curve.

Consider the following actual data:

Year	Ratio
34	.841
35	.846
36	.849
37	.850

The years are measured from the beginning year of the data base, e.g., year 34 = 34 + 1937 = 1971.

These data points may be expressed as a set of (x,P(x)) coordinates

(i)

(x,P(x))
(34,.841)
(35,.846)
(36,.849)
(37,.850)

corresponding to the general equation:

$$P(x) = k_1 + \frac{k_2 - k_1}{1 + e^{a+bx}} \tag{1}$$

The determination of appropriate values for <u>a</u> and <u>b</u> may be greatly simplified by a translation which is derived from the following algebraic manipulations of the original equation:

$$P(x) = k_1 + \frac{k_2 - k_1}{1 + e^{a + bx}}$$

$$P(x) - k_1 = \frac{k_2 - k_1}{1 + e^{a + bx}}$$

$$(1 + e^{a + bx})\ (P(x) - k_1) = k_2 - k_1$$

$$1 + e^{a + bx} = \frac{k_2 - k_1}{P(x) - k_1}$$

$$e^{a + bx} = \frac{k_2 - k_1}{P(x) - k_1} - 1$$

$$\ln\,[e^{a + bx}] = \ln\,[\frac{k_2 - k_1}{P(x) - k_1} - 1]$$

$$a + bx = \ln\,[\frac{k_2 - k_1}{P(x) - k_1} - 1] \tag{2}$$

For further simplicity, let the right hand member of equation (2) be denoted by z to obtain:

(3) $a + bx = z$ where $z = \ln[\frac{k_2 - k_1}{P(x) - k_1} - 1]$ or

(4) $z = a + bx$

By means of this translation, the problem of best fitting the logistic curve in equation (1) to the $(x, P(x))$ data points is reduced to the problem of best fitting the linear equation (4) to (x,z) coordinates where values of z are obtained from the original $P(x)$ values by the relationship in equation (3). Assume the limits have been fixed at $k_1 = .790$ and $k_2 = .875$.

For $P(x) = .841$,

$$z = \ln[\frac{.875 - .790}{.841 - .790} - 1] = \ln(.667) = -.405$$

In this manner, the set of original $(x,P(x))$ coordinates (i) are transformed into the following (x,z) coordinates:

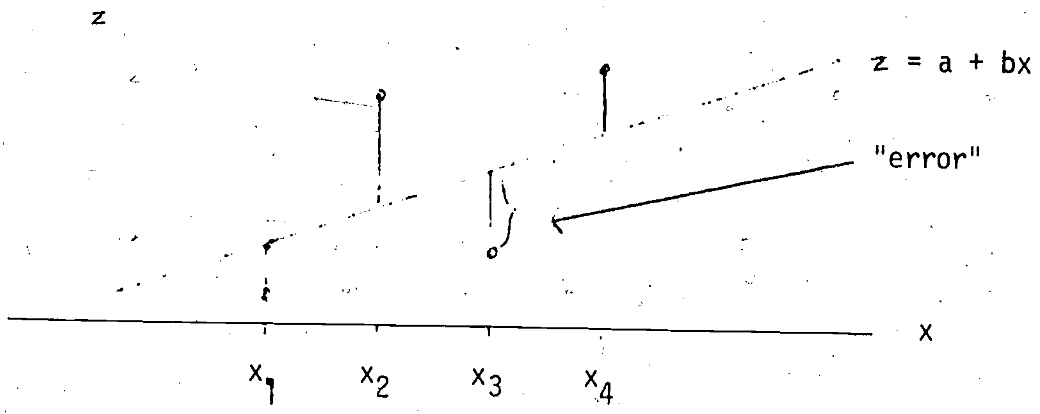
(ii)

(x,z)
(34,-.405)
(35,-.658)
(36,-.819)
(37,-.872)

While the translation just described has reduced the original complex problem into a linear setting, there still remains the problem of finding a straight line in the x,z-plane which will pass through all four points. In all probability, it will not be possible to find such a line and no exact solution will exist.

It therefore remains to assign values to a and b in a manner which gives the "best" near-solution possible. One of many criteria for determining which near-solution is "best" (or least worse) is the method of least squares used extensively in the field of statistics.

Basically, values for a and b are chosen such that the sum of the squares of the errors is kept to a minimum. a and b are chosen so that if the lengths of the "error" lines are squared and added, then this sum will be kept to a minimum. This procedure is illustrated in the following graph.



Computationally, these values for a and b are often found through a trial and error process. A rather sophisticated trial and error or searching process is contained in the MCHE model. However, if no greater complexity is encountered than in the example thus far described, a straightforward method for calculating the "best" (least squares) values for a and b is available:

$$b = \frac{N\Sigma(x \cdot z) - (\Sigma x)\cdot(\Sigma z)}{N\Sigma(x^2) - (\Sigma x)^2}$$

$$a = \frac{\Sigma z - (\Sigma x)\, b}{N}$$

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Where: N = the number of equations (or data points)
X = the x values (or years in our example)
Z = the z values (or ratios in our example)
Σ indicates the sum is taken over all the points (or years) involved.

The derivations and a discussion of this method may be found in many statistics textbooks under the topic of regression coefficients in a two variable linear equation. Recent models of hand calculators (such as the Texas Instruments SR-51A model) incorporate this formula so that one need enter only the data points from a linear system as in (3) and the values of a and b will be calculated automatically.

Once the values for a and b have been obtained, they are inserted into the original equation for P(x) and the future values of the given ratio are computed.

This process is repeated for each set of asymptotes or limits chosen for the given ratio. The entire process is then repeated for each new ratio considered.

One of the ratios projected in this manner by the model is the ratio of total public enrollment to total public and private enrollment. For the past five years this ratio has been: 1970--.839, 1971--.839, 1972--.842, 1973--.849, 1974--.851. The graph in Figure 2 of Chapter IV provides an indication of how the curve is fitted to the historical ratios and the effect of changing the upper asymptote to .875 in the first curve, .895 in the second and .950 in the third.

Ratios projected by this method are used throughout the model. Acceptability of a particular curve is determined by how reasonable the assumptions are for the upper and lower asymptotes as well as how well the curve has predicted the past several years. Normally, the asymptotes are changed little, if at all, and a new curve is fitted through the historic ratios augmented by the new ratios from the current year. In a few cases, however, abrupt changes in enrollment patterns may require more detailed consideration.

If the change is in the direction of a continuing but suddenly sharp increase, then the value previously used for the upper asymptote must be re-examined since it will determine upper limits for projected ratios. However, the lower asymptote should also be reconsidered since increasing its value to approach the historical data points will increase the steepness of the curve. Similar consideration should be given to other types of abrupt changes.

Changes in institutional status or other major unpredictable shifts in the educational scene may require the revision of data bases or the use of a correction factor contained within the model. Recently the University of Baltimore became a public institution and historical enrollment figures for this institution were transferred from the private sector data base to the State college and university sector data base. This type of modification does not occur very frequently, but when past trends are obviously not a valid predictor of the future, the model user must recognize it and input an alternative means of projecting into the future.

CHAPTER IV

A DESCRIPTION OF THE CALCULATION PROCEDURE

The MCHE Enrollment Projection Model consists of three modules. The first calculates the number of future high school graduates. The second takes these calculations and projects the total number of students enrolled in Maryland colleges. The third module then takes the total number of college enrollees and distributes them by level and by segment.

A. THE FIRST MODULE

There are several sets of historical data which serve as input to the first module. Live births are obtained from the Maryland Department of Vital Statistics. The Maryland Department of Education provides total public and private 10th grade enrollment and the number of high school graduates. Finally, the Census Bureau publications provide the age distribution of Maryland 10th graders.

The projected number of 10th graders is calculated based on births 13 to 18 years earlier adjusted by changing probabilities of being in 10th grade as determined from Census data and observed changes in the population of 13 to 18 year olds. These changes are due to many factors including in-migration and out-migration.

Table 1 shows how census data were used to calculate 10th grade enrollment probabilities. The last column shows the percent of each age group enrolled in 10th grade during the 1959-1960 school year. Table 2 shows the same data for the 1969-1970 school year.

TABLE 1

Calculation of 10th Graders as a Percent of Age Group
(Extracted From Census 1960 Table 101 Part 22)

PUBLIC HIGH SCHOOL

	MALE				FEMALE				TOTAL		
Age	Number Attended School	Percent in School	Total Population	10th Grade	Number Attended	Percent in School	Total Population	10th Grade	Total Population	10th Grade	Percent in 10th Grade
13	25,838	80.9	31,938	473	24,256	80.3	30,206	480	62,144	953	1.53
14	19,295	79.8	24,179	1,227	18,731	80.0	23,416	1,474	47,592	2,701	5.68
15	19,448	80.2	24,249	8,325	18,742	79.9	23,456	10,187	47,706	18,512	38.80
16	17,757	72.8	24,391	5,478	17,079	71.3	23,958	4,691	48,345	10,169	21.03
17	15,019	61.2	23,540	1,550	14,024	58.8	23,850	1,019	48,391	2,569	5.31
18	7,542	34.9	21,610	1,024*	5,934	27.3	21,736	926*	43,346	1,950*	4.50
TOTAL				18,077				18,777		36,854	

PRIVATE HIGH SCHOOL (Total Enrollment Less Public)

Age				10th Grade				10th Grade		10th Grade	Percent in 10th Grade
13				35				15		50	.08
14				170				175		345	.72
15				1,484				1,681		3,165	6.63
16				755				758		1,513	3.13
17				183				105		288	.60
18				241*				126*		367*	.85
TOTAL				2,868				2,860		5,728	

* - Includes 10th Graders not 13-18.

TABLE 2

Calculation of 10th Graders as a Percent of Age Group
(Extracted From Census 1970 Table 146 D22)

PUBLIC HIGH SCHOOL

	MALE				FEMALE				TOTAL		
Age	Number Attended School	Percent in School	Total Population	10th Grade	Number Attended	Percent in School	Total Population	10th Grade	Total Population	10th Grade	Percent in 10th Grade
13	34,928	85.1	41,043	153	34,416	85.2	40,394	90	81,437	243	.30
14	34.579	85.1	40,633	702	33,800	85.8	39,393	634	80,027	1,336	1.67
15	34.293	86.2	39,783	15,881	34,156	86.1	39.670	19,623	79,453	35,504	44.69
16	31,269	80.5	38,843	10,899	29,540	82.1	35,980	10,257	74,823	21,156	28.27
17	27,842	75.3	36,974	3,359	27,234	76.0	35,834	1,923	72,808	5,282	7.25
18	17,945	53.0	33,858	999*	14,356	42.2	34,018	700*	67,877	1,699*	2.50
TOTAL				31,993				33,227		65,220	

PRIVATE HIGH SCHOOL (Total Enrollment Less Public)

Age				10th Grade				10th Grade		10th Grade	Percent in 10th Grade
13				--				6		6	.01
14				65				88		153	.19
15				2,165				2,627		4,792	6.03
16				1,446				1,276		2,722	3.64
17				187				173		360	.49
18				97*				129*		226	.33
TOTAL				3,960				4,299		8,259	

* - Includes 10th Graders not 13-18.

Census enrollments differ slightly from Maryland State Department of Education enrollments as shown in Table 3.

TABLE 3

Maryland 10th Grade Enrollment

Sector	1959-1960		1969-1970	
	Census	MSDE	Census	MSDE
Public	36854	35757	65220	62533
Private	5728	4822	8259	7297

This is most likely due to the different reporting times and the fact that a substantial number of Maryland residents attend private schools in Washington, D.C. or out-of-state. The last column in Tables 1 and 2 were therefore adjusted to reflect Maryland State Department of Education enrollments. The adjusted probabilities are shown in Table 4.

Looking at 15 and 16 year olds, we see a slightly declining tendency to be in private 10th grade and a marked increase in the percentage of students in public 10th grade. To project future 10th grade enrollment a logistics curve as described in Chapter III was fitted through the two points for each age. Limits were placed on these curves in the form of asymptotes so that the probabilities of being in 10th grade would change only slightly from the 1970 points.

TABLE 4

Adjusted Probabilities of Being in 10th Grade by Age

	Public		Private	
Age	1960	1970	1960	1970
13	.015	.003	.001	.001
14	.055	.016	.006	.002
15	.376	.429	.056	.053
16	.204	.271	.026	.032
17	.052	.070	.005	.004
18*	.044	.024	.007	.003

* includes 3-12 year olds and 19-34 year olds as % of 18 year old population.

In this manner a series of historical and projected probabilities were obtained for each age group showing their probability of being in 10th grade at any point in time. By applying these probabilities against the total population of 13 year olds, 14 year olds, etc. for a particular year, the projected 10th grade enrollment is obtained for that year. If there were no deaths and no net interstate migrations, it would be reasonable to simply use births from 13 to 18 years earlier. However, in-migration, out-migration, and changing survival rates do affect future populations. Since no definitive statistics are available for the 13 to 18 age group, the adjustment necessary to increase births to the known population at any particular point was calculated over a period of time and a logistic or "S" curve fitted through these points. The points used for the 1974 projection are in Table 5.

TABLE 5

Net Migration and Other Factors

Year of Birth	%change to account for growth of Age Group 15 yrs.later
1941	25.1
1950	20.4
1952	20.1
1955	19.6
1956	19.6
1958	17.7

A lower asymptote of 0.0 was used in calculating future migration trends of this age group. This yielded a net increase of 8.7% on the 1967 births and a 5.1% increase on the 1972 births. These projections appear to be in line with the figures reported by the State Planning Department on migration patterns.

The total population figures by age thus obtained are multiplied by the probability of being in 10th grade as previously discussed, and the results compared with actual enrollments. Minor adjustments are made to the curves as necessary and the program is rerun until the results of the model are in close agreement with both public and private 10th grade enrollments over the past several years.

Total 10th grade enrollments are then compared to the total number of high school graduates three years later. By dividing graduates by 10th graders the probability of graduating is obtained. (See column 13 of Table 6.) Once again, an "S" curve is constructed and is fitted to the changing probabilities to obtain future probabilities which are then applied against the projected 10th graders to obtain projected high school graduates.

Table 6 is the computer report generated by this first module of the projection model. The first column is the year to which the data on a particular line apply. The second column is the index used within the computer programs. The third column contains live births for the particular year as reported by the Department of Vital Statistics. The fourth column indicates the size to which the birth group of column 3 will grow over a period of 15 years. (This number represents the population against which probabilities of being in 10th grade will be applied.) Column 5 is the model's estimate of public 10th graders. Column 6 is the actual number of public 10th graders as reported by the Department of Education. Column 7 is the ratio of column 6 to column 5, and thus shows how well the model is estimating public 10th grade enrollments. Columns 8, 9, and 10 are the same as 5, 6, and 7 but apply to private 10th graders. Column 11 is the sum of public and private 10th graders; actual data are used in this sum when they are available but the model's estimates are used when the actual data run out. Column 12 is the number of Maryland high school graduates as reported by the Department of Education and column 13 is the ratio of graduates to total 10th graders 3 years earlier. Column 14 is the model's estimate of high school graduates and the last column is the ratio of actual graduates to estimated graduates. The ratios displayed in the final column as well as columns 7 and 10 are displayed so that the model user can judge the reliability of the projections at each stage and make adjustments in asymptote assignments until satisfactory curves are obtained.

The calculation of high school graduates is the final result of the first module in the estimation model.

TABLE 6

ENROLLMENT PROJECTION MODEL--BIRTHS TO HIGH SCHOOL GRADUATES - SAMPLE

YEAR	DX	BRTHS	BRTHS + FUT MIG	EST PUB 10TH	ACT PUB 10TH	PUB 10TH AC/ES	EST PRI 10TH	ACT PRI 10TH	PRI 10TH AC/ES	CALC TOT 10TH	ACT HS GRADS	HSG TO TOT10	EST HS GRADS	GRAD ACT/ EST
1967	31	69726.	75785.	58097.	57142.	.9836	7478.	7286.	.9743	64428.	47023.	.8202	47438.	.9913
1968	32	68407.	73795.	60832.	59589.	.9796	7656.	7222.	.9433	66811.	48683.	.8205	48441.	1.0050
1969	33	69067.	73977.	62497.	62533.	1.0006	7406.	7297.	.9853	69830.	50908.	.8131	51140.	.9955
1970	34	69336.	73766.	64493.	64201.	.9955	7034.	7086.	1.0074	71287.	52843.	.8293	52573.	1.0051
1971	35	65399.	69140.	66224.	66324.	1.0015	6891.	7041.	1.0218	73365.	54818.	.8237	54685.	1.0024
1972	36	58310.	61285.	68231.	69357.	1.0165	6988.	6965.	.9967	76322.	56778.	.8123	57302.	.9908
1973	37			70986.	70819.	.9976	7236.	7186.	.9906	77987.	59120.	.0000	58622.	1.0085
1974	38			72031.	0.	.0000	7290.	0.	.0000	79321.	60428.	.0000	60437.	.9999
1975	39			72471.	0.	.0000	7305.	0.	.0000	79777.	62000.	.0000	62962.	.9847
1976	40			72559.	0.	.0000	7293.	0.	.0000	79852.	0.	.0000	64411.	.0000
1977	41			72497.	0.	.0000	7278.	0.	.0000	79775.	0.	.0000	65575.	.0000
1978	42			71310.	0.	.0000	7130.	0.	.0000	78441.	0.	.0000	66002.	.0000
1979	43			71099.	0.	.0000	7112.	0.	.0000	78211.	0.	.0000	66105.	.0000
1980	44			71262.	0.	.0000	7133.	0.	.0000	78394.	0.	.0000	66075.	.0000
1981	45			68683.	0.	.0000	6824.	0.	.0000	75507.	0.	.0000	64996.	.0000
1982	46			65786.	0.	.0000	6521.	0.	.0000	72307.	0.	.0000	64828.	.0000
1983	47			63166.	0.	.0000	6264.	0.	.0000	69431.	0.	.0000	64996.	.0000
1984	48			61095.	0.	.0000	6067.	0.	.0000	67161.	0.	.0000	62616.	.0000
1985	49			60325.	0.	.0000	6006.	0.	.0000	66331.	0.	.0000	59973.	.0000
1986	50			59983.	0.	.0000	5976.	0.	.0000	65959.	0.	.0000	57595.	.0000
1987	51			57775.	0.	.0000	5723.	0.	.0000	63498.	0.	.0000	55718.	.0000
1988	52			53037.	0.	.0000	5204.	0.	.0000	58241.	0.	.0000	55034.	.0000
1989	53			48115.	0.	.0000	4709.	0.	.0000	52825.	0.	.0000	54730.	.0000
1990	54			44340.	0.	.0000	4355.	0.	.0000	48695.	0.	.0000	52691.	.0000

B. THE SECOND MODULE

The second module of the enrollment projection model takes the high school graduates as calculated in the first module, and from these numbers, projects total college enrollment. Once again, Census data provide the best figures available on the age composition of Maryland college students. Tables 7, 8, 9, and 10 show the basic Census data and the derived values for males and females in the 1960 and 1970 Census. U. S. Census age distributions of college students are employed to derive a similar distribution of the official Maryland total enrollment, with age groups represented by the corresponding normal year of high school graduation. Then, the college and university enrollments of each age group are compared with the appropriate number of high school graduates for the corresponding year, in the form of a simple ratio, assuming 18 is the age of high school graduation. The last column in Table 7, for example, lists .0003 as the ratio between (15 year old) males in the 1962 high school graduating class who were enrolled in college in 1960 (11) and the total 1962 high school graduating class (30,271).[1]

The 1960 ratio is then paired with the corresponding ratio from the 1970 Census, the trend is identified, asymptotes are assigned, and an "S" curve is plotted through the points. This provides a rather extensive set of ratios. There is a different ratio for each sex and for each age group (24 ratios are used for each year). In addition, these ratios each change

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[1] Note that college participation rates for males by age group (in contrast to the ratios in Table 7) would be computed by dividing, for each age group, male college enrollment by male high school graduates. This model simply divides, for each age group, male college enrollment by the total high school graduates. In the example above, the participation rate as usually defined would be approximately twice that of the .0003 ratio listed.

TABLE 7

DERIVED RATIO OF 1960 MALE COLLEGE ENROLLMENT TO TOTAL (MALE AND FEMALE) HIGH SCHOOL GRADUATES, BY YEAR OF HIGH SCHOOL GRADUATION

Part A: Derivation of Age Distribution of Maryland Enrollment

Age Group 1960 U.S. Census (Column 1)	Normal Year of High School Graduation (Column 2)	Males Enrolled in Md. Colleges in 1960--U.S. Census Data		Males Enrolled in Md. Colleges in 1960--Official State Statistics	
		Number (Column 3)	Percentage (Column 4)	Total (Column 5)	Derived Age Distribution (Column 6)
15	1962	11	.03		11
16	1961	48	.15		51
17	1960	314	.97		332
18	1959	3,567	11.03		3,776
19	1958	4,374	13.53		4,631
20	1957	3,671	11.35		3,885
21	1956	3,381	10.46		3,581
22	1955	2,580	7.98		2,732
23	1954	1,998	6.18		2,116
24	1953	1,874	5.80		1,986
25-29	1952 - 1948	6,707	20.74		7,100
30-34	1947 - 1943	3,310	11.78		4,033
		31,335	100%	34,234	34,234

Part B: Total Number of High School Graduates by Year of Graduation

Normal Year of High School Graduation (Column 7)	Total Number of High School Graduates (Column 8)
1962	30,271
1961	30,716
1960	23,215
1959	23,345
1958	20,969
1957	19,534
1956	19,129
1955	17,297
1954	16,052
1953	15,237
1952 - 1948	61,375
1947 - 1943	57,634

Part C: Ratio of 1960 Male Enrollment to Total (Male and Female) High School Graduates

Normal Year of High School Graduation	Derived Ratio (Column 6) ÷ (Column 8)
1962	.0003
1961	.0017
1960	.0122
1959	.1617
1958	.2209
1957	.1989
1956	.1872
1955	.1579
1954	.1318
1953	.1303
1952 - 1948	.1157
1947 - 1943	.0700

TABLE 8

DERIVED RATIO OF 1960 FEMALE COLLEGE ENROLLMENT TO TOTAL (MALE AND FEMALE) HIGH SCHOOL GRADUATES, BY YEAR OF HIGH SCHOOL GRADUATION

Part A: Derivation of Age Distribution of Maryland Enrollment

Age Group 1960 U.S.Census (Column 1)	Normal Year of High School Graduation (Column 2)	Females Enrolled in Md. Colleges in 1960--U.S. Census Data: Number (Column 3)	Females Enrolled in Md. Colleges in 1960--U.S. Census Data: Percentage (Column 4)	Females Enrolled in Md. Colleges in 1960--Official State Statistics: Total (Column 5)	Females Enrolled in Md. Colleges in 1960--Official State Statistics: Derived Age Distribution (Column 6)
15	1962	0	.00		0
16	1961	41	.26		42
17	1960	495	3.15		508
18	1959	3,576	22.79		3,676
19	1958	3,326	21.19		3,418
20	1957	2,421	15.43		2,489
21	1956	1,920	12.23		1,973
22	1955	887	5.65		911
23	1954	485	3.09		498
24	1953	402	2.56		413
25-29	1952 - 1948	1,212	7.72		1,245
30-34	1947 - 1943	929	5.92		955
		15,694		16,132	16,132

Part B: Total Number of High School Graduates by Year of Graduation

Normal Year of High School Graduation (Column 7)	Total Number of High School Graduates (Column 8)
1962	30,271
1961	30,716
1960	27,215
1959	23,345
1958	20,969
1957	19,534
1956	19,129
1955	17,297
1954	16,052
1953	15,237
1952 - 1948	61,375
1947 - 1943	57,634

Part C: Ratio of 1960 Female Enrollment to Total (Male and Female) High School Graduates

Normal Year of High School Graduation	Derived Ratio (Column 6) ÷ (Column 8)
1962	.0000
1961	.0014
1960	.0187
1959	.1575
1958	.1630
1957	.1274
1956	.1031
1955	.0527
1954	.0311
1953	.0271
1952 - 1948	.0203
1947 - 1943	.0166

TABLE 9

DERIVED RATIO OF 1970 MALE COLLEGE ENROLLMENT TO TOTAL (MALE AND FEMALE) HIGH SCHOOL GRADUATES, BY YEAR OF HIGH SCHOOL GRADUATION

Part A: Derivation of Age Distribution of Maryland Enrollment

Age Group 1970 U.S.Census (Column 1)	Normal Year of High School Graduation (Column 2)	Males Enrolled in Md. Colleges in 1970--U.S. Census Data		Males Enrolled in Md. Colleges in 1970--Official State Statistics	
		Number (Column 3)	Percentage (Column 4)	Total (Column 5)	Derived Age Distribution (Column 6)
15	1972	21	.03		24
16	1971	34	.04		32
17	1970	377	.46		371
18	1969	8,357	10.30		8,303
19	1968	11,840	14.60		11,770
20	1967	10,614	13.09		10,553
21	1966	8,716	10.75		8,666
22	1965	6,947	8.57		6,908
23	1964	5,966	7.36		5,933
24	1963	4,155	5.12		4,128
25-29	1962-1958	16,355	20.17		16,260
30-34	1957-1953	7,716	9.51		7,667
		81,098		80,616	80,616

Part B: Total Number of High School Graduates by Year of Graduation

Normal Year of High School Graduation (Column 7)	Total Number of High School Graduates (Column 8)
1972	59,336
1971	58,897
1970	52,843
1969	50,845
1968	48,683
1967	46,843
1966	47,223
1965	47,154
1964	39,099
1963	32,554
1962-1958	132,516
1957-1953	87,249

Part C: Ratio of 1970 Male Enrollment to Total (Male and Female) High School Graduates

Normal Year of High School Graduation	Derived Ratio (Column 6) ÷ (Column 8)
1972	.0004
1971	.0005
1970	.0070
1969	.1633
1968	.2418
1967	.2253
1966	.1835
1965	.1465
1964	.1518
1963	.1268
1962-1958	.1227
1957-1953	.0879

TABLE 10

DERIVED RATIO OF 1970 FEMALE COLLEGE ENROLLMENT TO TOTAL (MALE AND FEMALE) HIGH SCHOOL GRADUATES, BY YEAR OF HIGH SCHOOL GRADUATION

Part A: Derivation of Age Distribution of Maryland Enrollment

Age Group 1970 U.S.Census (Column 1)	Normal Year of High School Graduation (Column 2)	Females Enrolled in Md. Colleges in 1970--U.S. Census Data		Females Enrolled in Md. Colleges in 1970--Official State Statistics	
		Number (Column 3)	Percentage (Column 4)	Total (Column 5)	Derived Age Distribution (Column 6)
15	1972	0	.00		0
16	1971	21	.04		21
17	1970	428	.86		456
18	1969	7,483	14.99		7,952
19	1968	9,800	19.63		10,414
20	1967	8,236	16.50		8,753
21	1966	6,428	12.88		6,833
22	1965	3,956	7.92		4,202
23	1964	2,605	5.22		2,769
24	1963	1,707	3.42		1,814
25-29	1962-1958	5,785	11.59		6,148
30-34	1957-1953	3,472	6.95		3,687
		49,921		53,050	53,050

Part B: Total Number of High School Graduates by Year of Graduation

Normal Year of High School Graduation (Column 7)	Total Number of High School Graduates (Column 8)
1972	59,336
1971	53,597
1970	52,843
1969	50,845
1968	48,683
1967	46,843
1966	47,223
1965	47,154
1964	39,099
1963	32,554
1962-1958	132,516
1957-1953	87,249

Part C: Ratio of 1970 Female Enrollment to Total (Male and Female) High School Graduates

Normal Year of High School Graduation	Derived Ratio (Column 6) ÷ (Column 8)
1972	.0000
1971	.0004
1970	.0086
1969	.1564
1968	.2139
1967	.1869
1966	.1447
1965	.0891
1964	.0708
1963	.0557
1962-1958	.0464
1957-1953	.0423

from year to year. To calculate the total college enrollment for a particular year, each of the 24 ratios for that year are multiplied by the appropriate number of high school graduates predicted or historically recorded for each group. For example, the 1980 total college enrollment can be represented by:

> Total Fall enrollment in 1980 = (1980 ratio for 15 year old males x 1983 high school graduates) + (1980 ratio for 15 year old females x 1983 high school graduates) + (1980 ratio for 16 year old males x 1982 high school graduates) + (1980 ratio for 16 year old females x 1982 high school graduates).....etc., for 12 age groupings of males and 12 age groupings of females.

The 1981 total college enrollment projection then uses a slightly different set of ratios and applies them against a different grouping of high school graduates.

The effect of out-of-state enrollment is indirectly considered in the model by virtue of the fact that high school graduates from other states who enroll in Maryland institutions are included in the total college enrollment. A more specific consideration of the effect of out-of-state enrollment could be added to the model if radical changes appear to be occurring in interstate student migration patterns. However, recent experience has shown that the present method produces acceptable results.

Table 11 is an example of the report generated by the second module. As before, the first column is the year and the second is the index used in the programs. The third column contains the historical or projected number of high school graduates which was the output of the first module. The fourth column is the actual number of men enrolled in all levels of college. The fifth is the model estimate of men enrolled and the sixth column is the ratio between the estimates and actual enrollments so that the user can evaluate the reliability of the curve used and change the asymptotes if

TABLE 11

MCHE ENROLLMENT PROJECTION MODEL--HIGH SCHOOL GRADS TO TOTAL COLLEGE ENROLLMENT - SAMPLE

YEAR	DX	HIGH SCHOOL GRADS	MEN ACT	MEN EST	MEN E/A	WOMEN ACT	WOMEN EST	WOMEN E/A	TOTAL ACT	TOTAL EST	TOTAL E/A	PCT MEN
195[illegible]	19	17297.	27210.	0.	.000[illegible]	12176.	0.	.00[illegible]0	39386.	0.	.0[illegible]	.6909
1956	20	19129.	2916[illegible].	0.	.0000	13196.	0.	.0000	42362.	0.	.00[illegible]	.68[illegible]5
1957	21	19534.	304[illegible]3.	0.	.0000	13757.	0.	.0000	4[illegible]20[illegible].	0.	.0[illegible]	.68[illegible]
1958	22	20969.	31794.	0.	.0000	14235.	0.	.0000	46029.	0.	.0000	.6907
1959	23	23345.	3423[illegible].	0.	.0000	16132.	0.	.000	50365.	0.	.0[illegible]	.6797
1960	24	27215.	35192.	0.	.0000	17304.	0.	.0000	52496.	0.	.0[illegible]	.6704
1961	25	30716.	39203.	0.	.0000	20728.	0.	.0000	59931.	0.	.0000	.6541
1962	26	30271.	42193.	0.	.0000	22917.	0.	.0000	65110.	0.	.00[illegible]0	.6480
1963	27	32554.	48190.	0.	.0000	27366.	0.	.0000	755[illegible]6.	0.	.0000	.6378
1964	28	39099.	53774.	0.	.0000	31253.	0.	.0000	85027.	0.	.00[illegible]	.6324
1965	29	47154.	61809.	0.	.0000	36785.	0.	.0000	98594.	0.	.000	.6269
1966	30	47326.	63899.	0.	.00[illegible]0	39793.	0.	.0000	103692.	0.	.0000	.6162
1967	31	47023.	69329.	0.	.0000	46181.	0.	.00[illegible]0	115510.	0.	.0[illegible]	.6002
1968	32	48683.	76427.	0.	.0000	4856[illegible].	0.	.000[illegible]	1249[illegible]3.	0.	.000	.6115
1969	33	50908.	80616.	81311.	1.0086	53050.	53265.	1.0041	13366[illegible].	134576.	1.0068	.6031
1970	34	52843.	86318.	85187.	.9869	61209.	61106.	.9983	147527.	146293.	.9916	.5851
1971	35	54818.	92156.	88728.	.9628	68241.	685[illegible]7.	1.0051	160397.	157315.	.9808	.5745
1972	36	56778.	93[illegible]81.	91953.	.9847	75465.	75914.	1.0060	168[illegible]46.	167867.	.9942	.5531
1973	37	59120.	94602.	94969.	1.0039	82263.	83062.	1.0097	176865.	178031.	1.0066	.5349
1974	38	60428.	96957.	97907.	1.0098	899[illegible].	89914.	.9991	186956.	187[illegible]2[illegible].	1.0046	.5186
1975	39	620[illegible].	.	100594.	[illegible]	.	96239.	[illegible]	.	196833.	[illegible]	.511[illegible]
1976	40	64111.	0.	103055.	.0000	0.	102032.	.0[illegible]0	0.	205087.	.0[illegible]0	.5025
1977	41	65575.	0.	105125.	.0000	0.	107097.	.0000	0.	212[illegible]2.	.00[illegible]	.4954
1978	42	66002.	0.	106947.	.000	0.	1[illegible]54[illegible].	.00[illegible]	0.	218490.	.0[illegible]	.4895

necessary. The 7th, 8th, and 9th columns contain the same data for women; and the 10th, 11th, and 12th columns provide the data on total male and female enrollments. The final column shows the changing sexual composition of the total enrollment each year.

The projection of the total college enrollments completes the output of this module of the enrollment model.

C. THE THIRD MODULE

Once the total number of students enrolled in college has been obtained, it remains to determine the segment in which the students will be enrolled, at what level they will enroll, and whether they will enroll as full-time or part-time students. This is done in the third module. Using data from the previous five years, a set of conditional probabilities is calculated in the model giving the likelihood that a student would fall into any of the following categories:

Community College Full-Time Student
Community College Part-Time Student
State College Undergraduate Full-Time Student
State College Undergraduate Part-Time Student
State College Graduate Full-Time Student
State College Graduate Part-Time Student
University of Maryland Undergraduate Full-Time Student
University of Maryland Undergraduate Part-Time Student
University of Maryland Graduate Full-Time Student
University of Maryland Graduate Part-Time Student
Private 2-Year College Full-Time Student
Private 2-Year College Part-Time Student
Private 4-Year College Undergraduate Full-Time Student
Private 4-Year College Undergraduate Part-Time Student

Private 4-Year College Graduate Full-Time Student

Private 4-Year College Graduate Part-Time Student

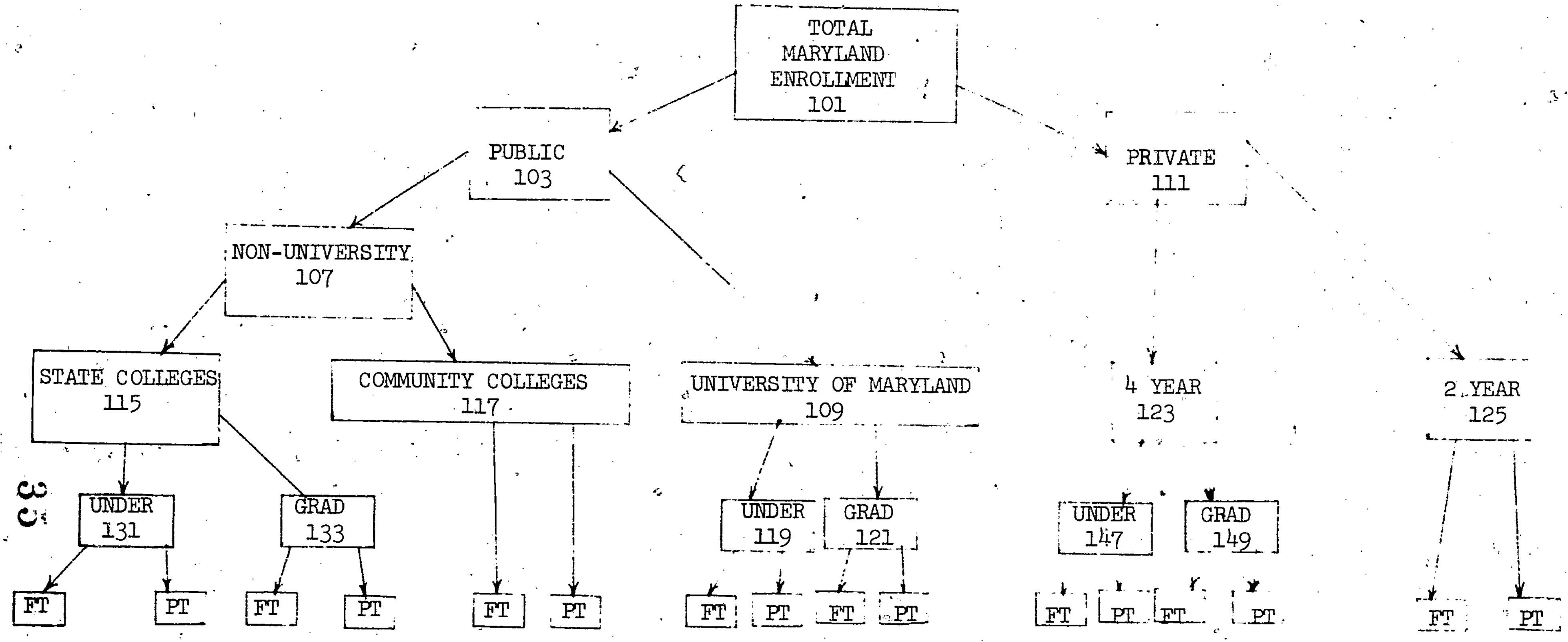
Once again, the "S" curve is used to project these probabilities into the future. Each year the probabilities change and are, of course, applied against changing year to year enrollments. Asymptotes are initially assigned by the model, but may be changed by the user to reflect known changes in enrollment trends or to reflect policy decisions which have been made. Figure 1 shows how the total enrollment is broken down to its component parts. Each set of arrows represents a set of conditional probabilities.

The first ratio to be considered is the probability of being in a public institution. In recent years, this has been:

1970	.839
1971	.839
1972	.842
1973	.849
1974	.851

In fitting a curve to these points for the 1974 projection run, an asymptote of .895 was used; that is, an upper limit of 89.5% was placed on the percentage of students who would be likely to attend a public college in the future. The model then fit a curve through the 1970 to 1974 points and projected into the future (but never above 89.5%) the percentage of students who would be likely to attend public institutions. Other asymptototes of .875 and .950 were considered, as discussed in Chapter II and as illustrated in Figure 2. These percentages were then applied by the model against the projected total enrollments to give projected public and projected private enrollments. This process was continued until the enrollments were distributed to all the categories listed earlier.

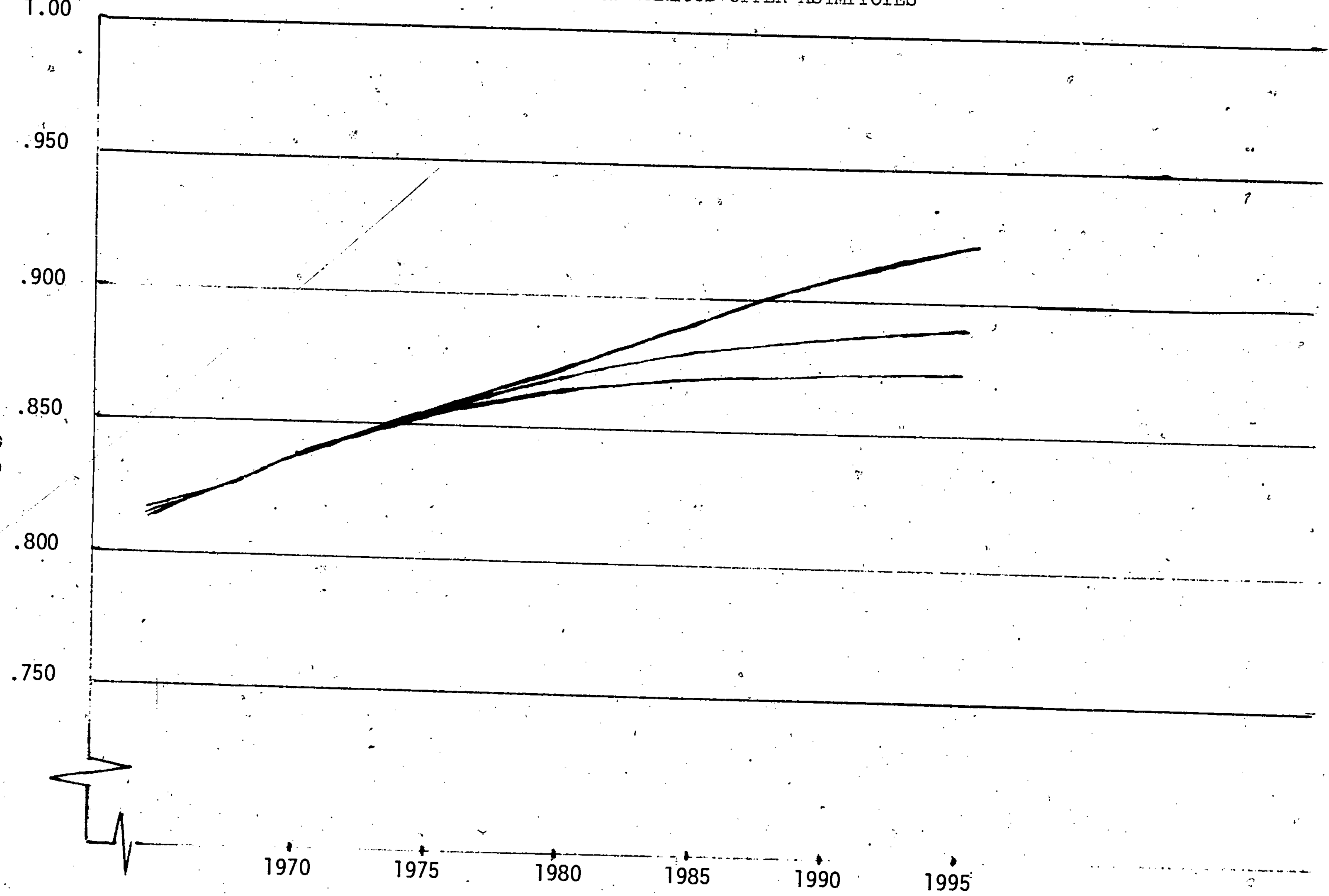
FIGURE 1



DISTRIBUTION OF TOTAL MARYLAND ENROLLMENT

FIGURE 2

EFFECT OF VARIOUS UPPER ASYMPTOTES



Lower Asymptote = .790 Upper Asymptotes = .875, .895, .950

Table 12 is a sample report from the 1974 model run. Headcount is simply the sum of full-time and part-time students while FTE (full-time equivalent) is defined to be equal to the number of full-time students plus 1/3 the number of part-time students.

TABLE 12

MCHE ENROLLMENT PROJECTION MODEL--ENROLLMENT BY SEGMENTS

1974 PROJECTED ENROLLMENTS

UNDERGRADUATE STUDENTS

	FULL TIME	PART TIME	HEAD COUNT	FTE
COMMUNITY COLLEGES	24804	38249	63053	37553
STATE COLLEGES	21873	9490	31363	25036
UNIVERSITY OF MD.	31139	13573	44712	35663
TOTAL PUBLIC	77816	61312	139128	98253
PRIVATE 4-YR COLLEGES	11499	4756	16255	13084
PRIVATE 2-YR COLLEGES	848	203	1051	915
TOTAL PRIVATE	12347	4959	17306	14000
TOTAL PUBLIC AND PRIVATE	90163	66271	156434	112253

GRADUATE STUDENTS

	FULL TIME	PART TIME	HEAD COUNT	FTE
STATE COLLEGES	1275	5551	6826	3125
UNIVERSITY OF MD.	6216	4369	10585	7672
TOTAL PUBLIC	7491	9920	17411	10797
PRIVATE 4-YR COLLEGES	3052	5188	8240	4781
TOTAL PUBLIC AND PRIVATE	10543	15108	25651	15579

TOTAL UNDERGRADUATE AND GRADUATE STUDENTS

	FULL TIME	PART TIME	HEAD COUNT	FTE
COMMUNITY COLLEGES	24804	38249	63053	37553
STATE COLLEGES	23148	15041	38189	28161
UNIVERSITY OF MO.	37355	17942	55297	43335
TOTAL PUBLIC	85307	71232	156539	109050
PRIVATE 4-YR COLLEGES	14551	9944	24495	17865
PRIVATE 2-YR COLLEGES	848	203	1051	915
TOTAL PRIVATE	15399	10147	25546	18781
TOTAL PUBLIC AND PRIVATE	100706	81379	182085	127832

CHAPTER V

PROCEDURES FOR RUNNING THE MODEL

Generally, the Model is run in the winter following the receipt and verification of the official college opening fall enrollments. The following steps are intended only as a general description of the operation of the model. In order to actually run the model, the user must be familiar with the complete program listing and the Univac 1108 system.

1. Request the last two years of birth statistics from the Department of Vital Statistics.

2. Request public and private 10th grade enrollment and total high school graduates for the past two years from the Department of Education. (Ms. Kris Hogan has supplied this information in the past.) Two years of data are requested so that final figures can be confirmed for the previous year, and to be sure that the data being received are compatible with the data used for previous years.

3. Compare the most recent data on college enrollments with the previous year's projections to determine the source of any errors in the previous year's projection.

4. All programs and data files are stored as program elements on a cop-out tape. Put the tape on the system and copy in the program file. Use the Editor made to change the data files to SDF Format. Refer to the System Flow Chart (Figure 3) for further steps.

5. Update file MDHSGB with the new graduate data.

6. Update file GRD10B with public and private 10th grade enrollment.

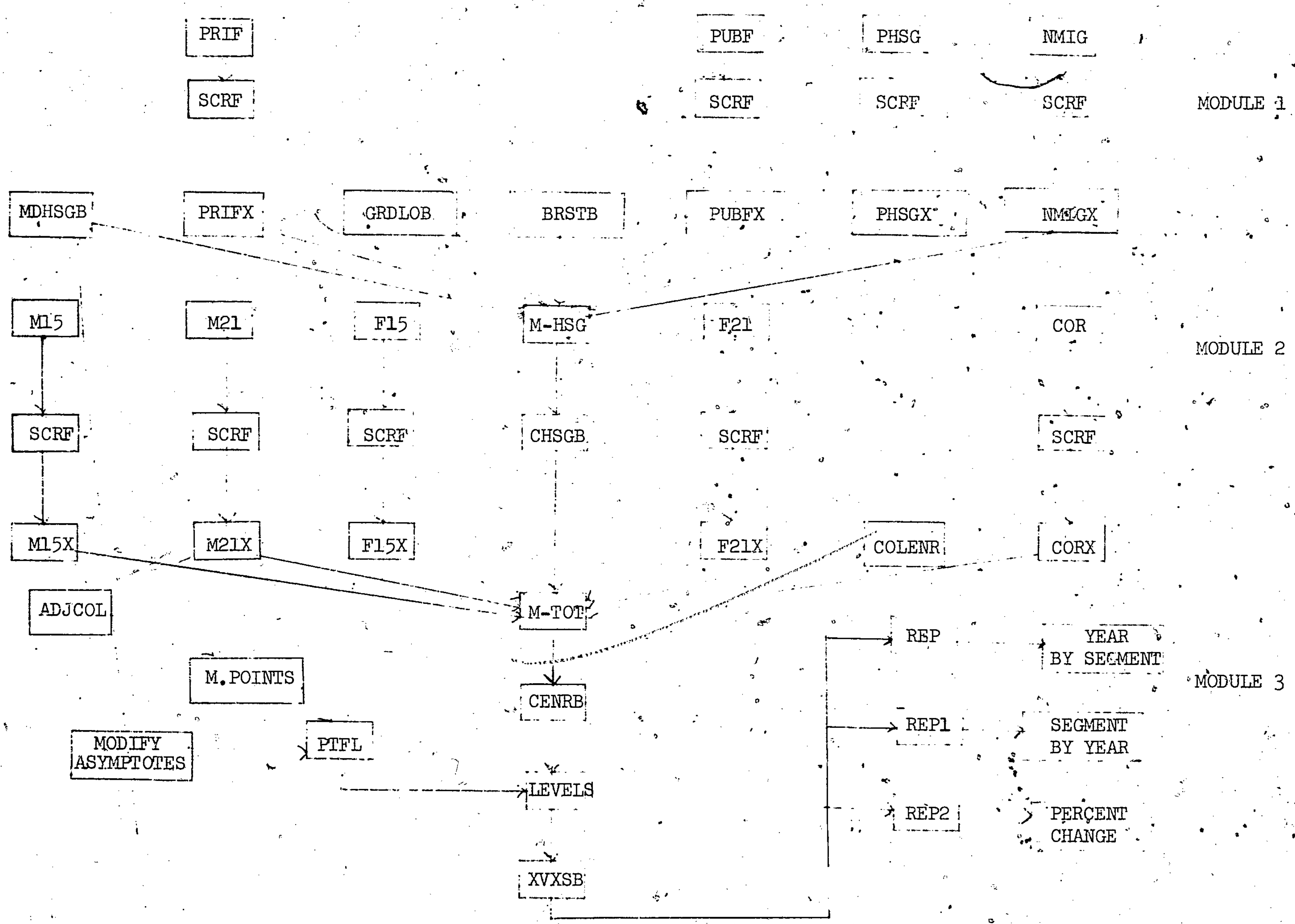
7. Update file BRSTB with new birth date.

8. If new Census data are available, update files PRIF and PUBF using the descriptive chapter as a guide. Then run job streams R-PRI and R-PUB to obtain curves through the new points.

9. Run job stream F-H to calculate new 10th grade estimates.

FIGURE 3

SYSTEM FLOW CHART
MCHE ENROLLMENT PROJECTION MODEL



10. Make adjustments if necessary to PRIF, PUBF, or NMIG and run any changed files through the SCRF program. Then rerun job stream F-H until 10th grade projections are satisfactory.

11. Add the new probability of graduating to PHSG file. (The probability is printed on the report generated by the R-H job stream.) Then run job stream R-PHSG to plot a new curve.

12. Rerun job stream F-H, making adjustments to PHSG until the graduate projections are satisfactory.

13. If new Census data are available, update M15, M21, F15, and F21. Then run all new files through the SCRF program.

14. Update COLENR with new college enrollments.

The private 4-year colleges and the state college figures for each of the five years have been adjusted to account for the change in status of the University of Baltimore in January 1975. All figures assume the University of Baltimore was always a State College.

15. Run job stream R-TOT to obtain total college enrollment projections.

16. Make minor modifications to curves generated from M15, M21, F15 and F21. Run changes through SCRF program and rerun job stream R-TOT until total enrollment projections are satisfactory. Note: COR is a file that enables the user to apply a correction factor to the total projection (correction factor in the form of an "S" curve). Thus far it has not been used; it currently contains a straight line adjustment of 1.0. If high school graduates to total enrollment ratio were changed to reflect only in-state enrollment, this would be one way to input out-of-state enrollment as a changing percentage of in-state enrollment.

17. The file ADJCOL contains college enrollment data for the last five years. Remove the oldest year and add the new data at the end. Of the 32 lines for each year, only 5 are used. There are four data entries on each line. The lines used are:

Line 05 Community Colleges

Field 1 - Blank

Field 2 - Blank

Field 3 - Full-Time Enrollment

Field 4 - Part-Time Enrollment

Line 06 University of Maryland

Field 1 - Undergraduate Full-Time Enrollment

Field 2 - Undergraduate Part-Time Enrollment

Field 3 - Graduate Full-Time Enrollment

Field 4 - Graduate Part-Time Enrollment

Line 07 Private 2-Year Colleges

Field 1 - Blank

Field 2 - Blank

Field 3 - Full-Time Enrollment

Field 4 - Part-Time Enrollment

Line 09 State Colleges

Field 1 - Undergraduate Full-Time Enrollment

Field 2 - Undergraduate Part-Time Enrollment

Field 3 - Graduate Full-Time Enrollment

Field 4 - Graduate Part-Time Enrollment

Line 13 Private 4-Year Colleges

Field 1 - Undergraduate Full-Time Enrollment

Field 2 - Undergraduate Part-Time Enrollment

Field 3 - Graduate Full-Time Enrollment

Field 4 - Graduate Part-Time Enrollment

18. Change the format statement which assigns indices to the output file in order to provide the appropriate index values for the updated data base.

19. Run job stream R-P to generate an initial file of points and asymptotes (PTFUL) to be used in distributing the total enrollments.

20. Modify asymptotes in file PTFL as appropriate and run job streams R-L and R-REP to get the projection distribution report.

21. Look over the report and repeat step 18 until the projections are satisfactory.

22. Minor changes may be necessary to programs REP, REP1, and REP2 to get year to year formats and to pick up the proper year data sets. Some of the actual enrollment data contained in file ADJCOL may be added to or replaced by part of file XVXSB to provide one or more years of actual data in the reports generated.

23. Change job stream R-REP to run REP1 and REP2 so that the other reports are generated.

24. Put data-files into program element format in one program file. Then copy-out file to tape. Check contents of tape before releasing disc files.

APPENDIX A

HISTORICAL ACCURACY OF THE MARYLAND COUNCIL FOR HIGHER EDUCATION ENROLLMENT PROJECTION MODEL

PAST PROJECTIONS OF TOTAL ENROLLMENTS

ACTUAL ENROLLMENTS

Fall 1970	Fall 1971	Fall 1972	Fall 1973	Fall 1974	Fall 1975	Fall 1980	Fall 1985
147527	160397	168846	176865	186956	206702	?	?

PROJECTED ENROLLMENTS

Projection Made in	Fall 1970	Fall 1971	Fall 1972	Fall 1973	Fall 1974	Fall 1975	Fall 1980	Fall 1985
Mar. 1970 % Error	146808 -0.49%	155800 -2.86%	165688 -1.87%	174933 -1.09%	183222 -2.00%	192342 -6.95%	228985	
Mar. 1971 % Error		160282 -0.07%	169605 +0.45%	179408 +1.44%	189163 +1.18%	198863 -3.79%	237546	
Feb. 1972 % Error			169604 +.45%	180406 +2.00%	191162 +2.25%	201863 -2.34%	245545	
Nov. 1973 % Error					182085 -2.61%	188781 -8.67%	217413	230132
Dec. 1974 % Error						196833 -4.78%	229320	237942
Dec. 1975							247036	259019

MEAN ABSOLUTE ERROR IN PROJECTIONS OF TOTAL ENROLLMENT

YEARS INTO FUTURE	% ERROR
1 yr.	1.68%
2 yrs.	2.56%
3 yrs.	1.85%
4 yrs.	1.54%
5 yrs.	2.90%

APPENDIX B

1970 CENSUS DATA

NOTE: The following three tables were xeroxed from U.S. Department of Commerce, Bureau of the Census, Census of Population: 1970, Detailed Characteristics: Maryland, Final Report PC (1)-D22 (Washington, D.C.: U.S. Government Printing Office, 1972), pp. 398-400.

Table 146. Year of School in Which Enrolled for Persons 3 to 34 Years Old by Race, Type of School, Sex, and Age: 1970

[Data based on sample; see text. For minimum base for derived figures (percent, median, etc.) and meaning of symbols, see text]

The State
Urban and Rural
Standard Metropolitan Statistical Areas of 250,000 or More

THE STATE

Total

All Types of School

	Persons enrolled in school		Year of school in which enrolled																		
			Nursery school	Kindergarten	Elementary school								High school				College				
	Number	Percent			1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5 or more
Total, 3 to 34 years old	1 168 116	54.0	24 651	65 417	84 574	82 515	86 981	84 953	85 368	82 661	82 846	82 048	76 754	73 479	63 346	61 504	36 599	30 635	22 003	20 395	21 387
Male, 3 to 34 years old	608 903	56.5	12 793	33 408	43 609	42 913	44 530	43 588	43 715	41 652	42 365	41 952	38 265	35 953	32 400	30 662	21 753	18 577	12 936	12 008	15 824
3 years old	3 742	10.5	3 488	167	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	7 989	21.1	6 488	1 288	181	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	26 304	65.0	2 458	22 636	1 017	120	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	38 255	93.2	267	8 918	27 628	1 268	151	23	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	40 051	97.2	92	399	13 134	24 887	1 432	74	33	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	40 861	97.5	-	-	1 139	14 408	24 193	961	108	52	-	-	-	-	-	-	-	-	-	-	-
9 years old	41 255	97.9	-	-	96	1 637	15 451	23 102	841	106	22	-	-	-	-	-	-	-	-	-	-
10 years old	41 637	97.3	-	-	71	217	2 542	15 494	22 346	836	78	53	-	-	-	-	-	-	-	-	-
11 years old	40 449	98.1	-	-	24	50	287	3 027	15 978	20 167	721	127	68	-	-	-	-	-	-	-	-
12 years old	41 183	98.0	-	-	-	-	80	496	3 511	15 420	20 719	792	130	35	-	-	-	-	-	-	-
13 years old	40 172	97.9	-	-	6	26	46	83	563	4 075	14 695	19 760	758	153	7	-	-	-	-	-	-
14 years old	39 387	96.9	-	-	-	6	30	57	94	592	4 474	14 862	18 464	767	25	16	-	-	-	-	-
15 years old	38 296	96.2	-	-	14	22	5	10	61	149	1 166	4 840	13 479	18 046	424	59	21	-	-	-	-
16 years old	35 535	91.5	-	-	20	6	4	27	44	34	195	1 011	4 018	12 345	17 343	454	22	12	-	-	-
17 years old	31 774	86.0	-	-	13	33	6	30	6	29	68	193	832	3 546	11 119	15 522	371	6	-	-	-
18 years old	22 775	67.2	-	-	23	40	60	18	13	50	47	88	250	667	2 850	10 312	7 902	401	34	20	-
19 years old	16 060	50.7	-	-	8	21	39	35	21	11	63	92	120	264	445	3 101	5 199	6 366	242	33	-
20 years old	11 293	37.4	-	-	8	18	41	31	15	14	21	13	40	27	49	402	1 599	4 079	4 586	306	43
21 years old	9 048	30.4	-	-	-	14	6	41	7	16	-	7	6	14	51	170	768	1 600	2 719	3 514	115
22 years old	7 136	21.8	-	-	4	-	13	16	-	14	16	15	-	11	9	91	991	986	1 116	2 516	1 338
23 years old	6 176	18.1	-	-	11	-	17	-	6	15	10	20	12	11	7	101	1 054	1 061	757	1 155	1 939
24 years old	4 300	16.3	-	-	10	7	-	6	8	11	6	17	25	-	-	55	586	709	600	725	1 535
25 to 29 years old	16 953	12.2	-	-	72	44	-	36	21	13	25	24	55	52	44	212	2 217	2 366	2 004	2 599	7 170
30 to 34 years old	8 272	7.1	-	-	43	57	54	21	39	48	39	38	8	15	27	167	1 023	991	878	1 140	3 684
Female, 3 to 34 years old	559 213	51.6	11 858	32 009	40 965	39 602	42 451	41 365	41 653	41 009	40 481	40 096	38 489	37 526	30 946	30 842	14 846	12 058	9 067	8 387	5 563
3 years old	3 371	9.7	3 151	174	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	7 792	21.2	6 338	1 328	121	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	25 419	66.2	2 149	21 854	1 230	114	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	37 577	93.5	166	8 308	27 617	1 277	155	54	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	37 825	97.3	54	345	10 928	24 704	1 647	117	30	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	39 980	97.8	-	-	687	11 988	26 155	988	124	38	-	-	-	-	-	-	-	-	-	-	-
9 years old	39 734	97.9	-	-	71	1 052	12 507	24 792	1 220	60	32	-	-	-	-	-	-	-	-	-	-
10 years old	40 144	97.7	-	-	33	144	1 432	13 221	24 148	1 052	50	64	-	-	-	-	-	-	-	-	-
11 years old	39 722	98.0	-	-	32	15	188	1 688	13 320	23 484	857	112	28	-	-	-	-	-	-	-	-
12 years old	40 860	98.3	-	-	22	52	66	189	2 276	13 248	23 900	966	119	22	-	-	-	-	-	-	-
13 years old	39 599	98.0	-	-	12	8	10	47	270	2 532	12 451	23 226	915	96	32	-	-	-	-	-	-
14 years old	38 183	97.0	-	-	-	17	55	35	32	269	2 430	12 324	22 217	722	63	19	-	-	-	-	-
15 years old	38 289	96.5	-	-	24	28	13	20	44	71	418	2 608	12 130	22 250	643	40	-	-	-	-	-
16 years old	33 303	92.6	-	-	33	6	6	11	20	71	137	481	2 244	11 533	18 098	642	10	11	-	-	-
17 years old	31 073	86.7	-	-	14	18	-	7	6	16	89	124	482	2 096	9 999	17 794	385	30	13	-	-
18 years old	18 763	55.2	-	-	-	6	41	46	29	52	39	51	120	418	1 466	9 012	7 113	295	19	56	-
19 years old	13 161	39.4	-	-	20	29	13	53	54	25	18	51	100	206	414	2 378	3 658	5 728	367	47	-
20 years old	8 722	26.2	-	-	7	13	28	19	17	36	5	-	14	33	39	275	859	2 902	4 107	346	22
21 years old	6 645	20.5	-	-	6	22	-	-	-	8	-	15	12	9	4	141	472	832	2 165	2 860	99
22 years old	4 117	11.5	-	-	6	6	7	13	-	-	8	7	-	22	-	92	293	437	694	1 978	552
23 years old	2 761	7.7	-	-	-	13	-	10	-	-	-	11	14	26	13	69	348	326	367	770	794
24 years old	1 852	6.3	-	-	5	-	12	-	20	-	7	10	30	13	4	44	318	222	214	347	606
25 to 29 years old	6 331	4.4	-	-	24	66	19	21	13	17	24	40	13	63	87	209	774	709	713	1 317	2 267
30 to 34 years old	3 940	3.3	-	-	27	19	25	34	30	30	16	6	51	17	84	127	616	566	408	666	1 223

Table 146. Year of School in Which Enrolled for Persons 3 to 34 Years Old by Race, Type of School, Sex, and Age: 1970—Continued

[Data based on sample, see text. For minimum base for derived figures (percent, median, etc.) and meaning of symbols, see text]

The State
Urban and Rural
Standard Metropolitan Statistical Areas of 250,000 or More

THE STATE—Continued

Total—Continued

Public School

	Persons enrolled in school		Year of school in which enrolled																		
					Elementary school								High school				College				
	Number	Percent	Nursery school	Kindergarten	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5 or more
Total, 3 to 34 years old	**966 020**	**44.7**	**6 439**	**56 511**	**74 224**	**72 064**	**75 764**	**73 321**	**74 327**	**71 135**	**71 577**	**71 772**	**68 447**	**65 220**	**55 036**	**52 476**	**23 549**	**19 277**	**12 683**	**11 147**	**9 651**
Male, 3 to 34 years old	**498 707**	**46.2**	**3 236**	**28 859**	**38 704**	**37 193**	**38 937**	**37 996**	**38 068**	**35 891**	**36 502**	**36 815**	**33 981**	**31 993**	**28 649**	**26 051**	**14 078**	**11 545**	**7 200**	**6 076**	**6 933**
3 years old	1 145	3.2	911	147	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	2 687	7.1	1 505	1 015	147	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	21 270	52.5	614	19 577	897	114	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	33 740	82.2	145	7 785	24 516	1 126	142	23	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	35 170	85.3	58	335	11 657	21 695	1 323	74	28	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	35 174	83.9	-	-	1 035	12 224	20 906	865	92	52	-	-	-	-	-	-	-	-	-	-	-
9 years old	35 959	85.3	-	-	85	1 506	13 562	19 925	775	84	22	-	-	-	-	-	-	-	-	-	-
10 years old	36 028	84.2	-	-	50	217	2 360	13 522	19 042	727	57	53	-	-	-	-	-	-	-	-	-
11 years old	34 966	84.8	-	-	24	43	245	2 753	13 997	17 064	652	120	68	-	-	-	-	-	-	-	-
12 years old	35 399	84.3	-	-	-	-	49	484	3 295	13 295	17 389	722	130	35	-	-	-	-	-	-	-
13 years old	34 928	85.1	-	-	6	20	41	76	539	3 779	12 677	16 955	675	153	7	-	-	-	-	-	-
14 years old	34 579	85.1	-	-	-	-	30	49	78	553	4 129	13 009	16 006	702	7	16	-	-	-	-	-
15 years old	34 293	86.2	-	-	14	22	5	10	51	143	1 117	4 512	12 073	15 831	385	59	21	-	-	-	-
16 years old	31 269	80.5	-	-	13	6	4	20	40	27	189	960	3 764	10 899	14 953	379	9	6	-	-	-
17 years old	27 842	75.3	-	-	13	33	6	22	6	21	60	193	800	3 359	9 947	13 136	240	6	-	-	-
18 years old	17 945	53.0	-	-	23	34	45	18	8	34	35	80	240	613	2 718	8 938	4 866	261	25	7	-
19 years old	10 793	34.1	-	-	-	12	39	31	21	7	63	86	109	236	445	2 614	3 192	3 760	158	18	-
20 years old	6 616	21.9	-	-	8	18	35	26	15	6	21	13	34	27	49	353	1 013	2 475	2 384	109	[illegible]
21 years old	5 274	17.7	-	-	-	10	-	25	7	16	-	7	6	14	51	124	560	1 196	1 523	[illegible]	[illegible]
22 years old	3 944	12.0	-	-	4	-	13	16	-	14	16	15	-	3	9	57	701	635	607	1 274	580
23 years old	3 597	10.5	-	-	11	-	17	-	6	15	5	20	12	11	7	76	733	690	519	625	850
24 years old	2 351	8.9	-	-	4	7	-	-	8	6	6	17	25	-	-	55	435	446	381	317	644
25 to 29 years old	9 232	6.7	-	-	72	37	-	36	21	13	25	17	31	43	44	117	1 579	1 495	1 107	1 483	3 212
30 to 34 years old	4 406	3.8	-	-	38	49	47	21	39	35	39	36	8	15	27	127	729	575	496	564	1 561
Female, 3 to 34 years old	**467 313**	**43.1**	**3 203**	**27 652**	**35 520**	**34 871**	**36 827**	**35 825**	**36 259**	**35 244**	**35 075**	**34 957**	**34 466**	**33 227**	**27 287**	**26 425**	**9 471**	**7 732**	**5 483**	**5 071**	**2 718**
3 years old	984	2.8	769	149	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	2 735	7.4	1 506	1 119	105	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	20 906	54.5	772	18 851	1 099	114	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	32 617	81.1	108	7 211	23 942	1 153	149	54	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	33 012	84.9	28	322	9 436	21 617	1 462	117	30	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	34 649	84.7	-	-	606	10 583	22 421	884	117	38	-	-	-	-	-	-	-	-	-	-	-
9 years old	34 522	85.1	-	-	62	1 021	10 934	21 360	1 058	55	32	-	-	-	-	-	-	-	-	-	-
10 years old	34 648	84.3	-	-	33	124	1 333	11 415	20 702	936	41	64	-	-	-	-	-	-	-	-	-
11 years old	34 243	84.5	-	-	32	8	188	1 565	11 756	19 813	741	112	28	-	-	-	-	-	-	-	-
12 years old	35 387	85.1	-	-	14	30	66	171	2 146	11 582	20 412	841	101	22	-	-	-	-	-	-	-
13 years old	34 416	85.2	-	-	12	8	10	47	242	2 348	10 844	19 934	849	90	32	-	-	-	-	-	-
14 years old	33 800	85.8	-	-	-	17	44	35	27	226	2 298	10 817	19 624	634	63	15	-	-	-	-	-
15 years old	34 156	86.1	-	-	15	28	13	9	39	66	403	2 443	10 913	19 623	574	30	-	-	-	-	-
16 years old	29 540	82.1	-	-	33	6	6	7	10	51	108	461	2 171	10 257	15 822	595	6	7	-	-	-
17 years old	27 234	76.0	-	-	14	18	-	7	6	7	89	124	446	1 923	8 826	15 520	217	30	7	-	-
18 years old	14 356	42.2	-	-	-	6	41	37	22	17	27	45	103	374	1 393	7 606	4 445	179	11	50	-
19 years old	8 740	26.1	-	-	7	11	13	38	54	14	18	34	100	145	352	1 873	2 320	3 508	221	32	-
20 years old	5 489	16.5	-	-	7	13	14	19	6	36	5	-	14	27	39	251	531	1 939	2 406	171	11
21 years old	4 148	12.8	-	-	-	16	-	-	-	8	-	15	12	9	4	119	283	544	1 411	1 677	50
22 years old	2 525	7.1	-	-	6	-	7	6	-	-	8	7	-	22	-	54	184	255	467	1 184	325
23 years old	1 600	4.5	-	-	-	13	-	10	-	-	-	11	14	20	13	41	248	204	190	486	350
24 years old	1 155	4.0	-	-	5	-	12	-	14	-	7	3	27	13	4	41	238	189	126	199	277
25 to 29 years old	3 913	2.7	-	-	24	61	19	21	5	17	24	40	13	51	81	191	557	490	415	852	1 052
30 to 34 years old	2 538	2.1	-	-	22	19	25	23	23	30	18	6	51	17	64	89	442	387	229	420	653

Table 146. Year of School in Which Enrolled [illegible] Persons 3 to 34 Years Old by Race, Type of School, Sex, and Age: 1970—Continued

(Data based on sample, see text. For [illegible] base for derived figures (percent, median, etc.) and meaning of symbols, see text)

The State
Urban and Rural
Standard Metropolitan Statistical Areas of 250,000 or More

THE STATE—Continued

Total—Continued

Parochial School

	Persons enrolled in school: Number	Persons enrolled in school: Percent	Nursery school	Kindergarten	Elementary school: 1	2	3	4	5	6	7	8	High school: 1	2	3	4	College: 1	2	3	4	[illegible]
Total, 3 to 34 years old	101 873	4.7	1 513	2 453	8 754	8 739	9 694	9 759	9 586	9 731	9 343	8 531	5 507	5 190	4 673	4 479	877	877	724	740	702
Male, 3 to 34 years old	50 165	4.7	795	1 253	4 071	4 739	4 743	4 712	4 858	4 769	4 664	4 108	2 677	2 309	2 180	2 144	373	460	377	405	505
3 years old	182	0.5	182	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	481	1.3	[illegible]	35	25	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	1 149	2.8	[illegible]	852	111	6	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	3 032	[illegible]	[illegible]	[illegible]	2 610	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	4 155	[illegible]	19	52	1 250	[illegible]	103	-	5	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	4 763	[illegible]	-	-	70	[illegible]	[illegible]	[illegible]	16	-	-	-	-	-	-	-	-	-	-	-	-
9 years old	4 539	10.8	-	-	-	103	[illegible]	[illegible]	41	[illegible]	-	-	-	-	-	-	-	-	-	-	-
10 years old	4 754	11.1	-	-	-	-	113	[illegible]	[illegible]	78	[illegible]	-	-	-	-	-	-	-	-	-	-
11 years old	4 558	11.1	-	-	-	-	19	[illegible]	1 672	[illegible]	53	-	-	-	-	-	-	-	-	-	-
12 years old	4 742	11.3	-	-	-	-	[illegible]	[illegible]	174	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-
13 years old	4 264	10.4	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-
14 years old	3 431	8.4	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-
15 years old	2 432	6.1	-	-	-	6	-	-	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-
16 years old	2 525	6.5	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-
17 years old	2 132	5.8	-	-	-	-	-	-	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-
18 years old	659	[illegible]	-	-	-	-	-	-	-	-	[illegible]	-	5	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-
19 years old	396	[illegible]	-	-	-	6	15	-	5	6	12	-	[illegible]	-	5	[illegible]	[illegible]	[illegible]	-	-	-
20 years old	327	[illegible]	-	-	-	-	-	[illegible]	-	-	-	-	6	-	-	[illegible]	[illegible]	167	[illegible]	9	-
21 years old	258	0.9	-	-	-	[illegible]	-	[illegible]	-	-	-	-	-	-	-	-	[illegible]	112	144	[illegible]	[illegible]
22 years old	252	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	45	59	[illegible]	-
23 years old	[illegible]	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24 years old	179	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25 to 29 years old	361	0.3	-	-	-	[illegible]	-	[illegible]	-	5	-	-	-	5	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30 to 34 years old	162	0.1	-	-	5	8	[illegible]	-	-	[illegible]	-	-	-	-	-	5	12	10	[illegible]	22	[illegible]
Female, 3 to 34 years old	51 708	4.8	718	1 200	4 683	4 000	4 951	5 047	4 728	4 962	4 659	4 423	2 830	2 881	2 493	2 335	504	417	347	332	198
3 years old	197	0.6	197	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4 years old	479	[illegible]	377	86	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 years old	1 048	2.7	128	826	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 years old	3 566	8.9	5	[illegible]	3 205	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7 years old	4 101	[illegible]	[illegible]	17	1 256	2 654	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 years old	4 668	[illegible]	-	-	81	[illegible]	[illegible]	93	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-
9 years old	4 732	[illegible]	-	-	9	23	[illegible]	[illegible]	[illegible]	5	-	-	-	-	-	-	-	-	-	-	-
10 years old	4 951	[illegible]	-	-	-	14	71	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-
11 years old	4 763	[illegible]	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-
12 years old	4 742	[illegible]	-	-	6	22	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-
13 years old	[illegible]	[illegible]	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-
14 years old	[illegible]	[illegible]	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-	-
15 years old	[illegible]	[illegible]	-	-	9	-	-	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-	-
16 years old	[illegible]	[illegible]	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-	-
17 years old	[illegible]	[illegible]	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-	-
18 years old	[illegible]	[illegible]	-	-	-	-	-	-	-	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	-	-	-
19 years old	552	[illegible]	-	-	-	-	-	-	-	[illegible]	-	[illegible]	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-
20 years old	326	[illegible]	-	-	-	-	-	-	-	-	-	6	-	6	[illegible]	-	[illegible]	[illegible]	[illegible]	[illegible]	-
21 years old	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	26	[illegible]	[illegible]	-
22 years old	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	33	[illegible]
23 years old	[illegible]	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	-
24 years old	67	[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	[illegible]	-	9	[illegible]
25 to 29 years old	244	[illegible]	-	-	-	5	-	-	[illegible]	-	-	-	[illegible]	5	[illegible]	-	6	6	[illegible]	65	[illegible]
30 to 34 years old	[illegible]	[illegible]	-	-	5	-	-	-	-	-	-	-	-	-	-	-	[illegible]	[illegible]	[illegible]	14	[illegible]

Other Private School

	Number	Percent	Nursery school	Kindergarten	Elementary school: 1	2	3	4	5	6	7	8	High school: 1	2	3	4	College: 1	2	3	4	[illegible]
Total, 3 to 34 years old	100 223	4.6	15 499	6 453	1 596	1 712	[illegible]	1 373	1 455	1 795	1 926	1 745	2 800	3 069	2 737	[illegible] 549	12 173	10 481	8 596	8 508	11 633
Male, 3 to 34 years old	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	6 572	[illegible]	5 524	[illegible]
Female, 3 to 34 years old	[illegible] 192	[illegible]	7 437	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3 909	3 237	[illegible]	[illegible]