DOCUMENT RESUME

ED 086 642 SP 007 540

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TITLE Manpower Forecasts: Teacher Education in North Carolina 1971-1982.
PUB DATE May 72
NOTE 63p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Educational Trends; Employment Projections; *Enrollment Trends; *Manpower Needs; Population Growth; *School Demography; *State Surveys; Teacher Distribution; Teacher Employment; *Teacher Supply and Demand
IDENTIFIERS North Carolina

ABSTRACT

This publication reports the findings of the North Carolina Board of Higher Education Research Division. The study yields the following information: a) elementary and secondary school education in North Carolina will not be a growth industry in the 1970s because of the decline in school enrollments; b) the rate of growth in the demand for teachers will be falling due to declining school enrollments; c) the supply of teacher education graduates from North Carolina colleges and universities will be rising in the 1970s; d) teachers' salaries are expected to remain constant throughout the 1970s. thus affecting the re-entry patterns of former teachers into the field of education; e) changes in college curricula, designed to offer career alternatives to students, should be reviewed and studied; and f) areas where an oversupply of teachers exists should be observed. Eighteen tables of data are included in the study along with population statistics. (BRB)

May 1972

MANPOWER FORECASTS: TEACHER EDUCATION IN NORTH CAROLINA 1971-1982

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INTRODUCTION:

Although a university education is a personal satisfaction to the student who strives to achieve the highest intellectual level possible, it also involves the preparation of a person to occupy a place in a complex technological society. Expansion of higher education programs, therefore, should be undertaken only in response to a careful analysis of supply and demand for persons of advanced educational attainment.

A cogent case can be made for government to try to predict future manpower requirements for every occupation, and then to filter down the information to the institutions. Institutions have an obligation to provide all available knowledge to students on existing (and expected) conditions in the labor market. This form of planning is done to various extents in a number of countries; namely, Sweden, France, and others. In France, the "Organisation de Coopération et de Développement Économiques" (OECD) has been involved in such planning for over a decade, and some of their planning models are readily adaptable to manpower studies in the United States.

In viewing any manpower study, it must be recognized that the art of forecasting is inexact, and that future demand for higher education graduates cannot be predicted with high accuracy most of the time. Also, changing economic environments can cause great fluctuations in the employment demand of some graduates. The addition of new school programs, such as kindergarten, would affect the demand for pre-school teachers. School enrollments would increase drastically

from one year to the next, due to the additional stock of pupils. Some persons, moreover, who undertake certain programs of studies may not desire to engage in professional practice, or may do so only on a part-time basis, thus building up a large labor reserve in those programs. This is the case in occupations where women comprise a large portion of the total.

Manpower forecasts are principally used as follows:

1) to alert decision-makers to emerging manpower problems, and, in doing so, to help change the route, if the current one is leading to unacceptable ends

2) to develop policies and programs related to education and training

3) to aid decision-makers in choosing between alternative proposed policies

4) to provide information for the career guidance of youth

5) to develop policies for providing sufficient manpower for critical occupations

6) to provide the general public with information on potential manpower problems

If effectiveness is desired, the underlying concept of the North Carolina Board of Higher Education's manpower studies should be dynamic. That is, as more information becomes available, revisions should be made, resulting in constant improvement of predictions. Continuous updating of manpower studies should provide the most current available facts. This continuing analysis and revision of forecasts can only lead to better information, and, hence, if utilized, to better policy-making. Moreover, it is essential that manpower forecasts be fully publicized, for only through public awareness will the full benefits from such studies be procured.

THE PROBLEM

The Board of Higher Education has statutory responsibility in the approval process of university programs. Knowledge about future market conditions in various program areas, consequently, should be a primordial ingredient in the decision-making step. This logically follows for, without some picture of future demand and supply, resource waste and program duplication would ensue.

Past population growth has created a demand for college and university program expansion. This was the case over the past ten years. The prospect of a slowing population growth, with its implications for the course of the economy, has accentuated the need for more careful program planning. National studies, as documented in Folger, Astin, and Bayer's Human Resources and Higher Education, indicate that educational planners at the state level have not paid attention to specific demands in academic fields (excepting medicine). In the past, manpower studies have been used (chiefly) as a justification for planned expansion, rather than for estimating the kinds of programs that will be required by society. In some cases, when expansion was needed in specific areas, the total educational system has been expanded. This has proved wasteful, since it produces "over-supply" in some areas. Fortunately, during past years, this "over-supply" has been absorbed, to some extent, probably because a college education is regarded by some employers as a measure of intelligence and signifies the possession of a set of desirable values and attitudes. Also, college students have shown flexibility in accepting positions not related directly to their training or, in some cases, not commensurate with their expectations.

The future of post-secondary education is less certain in the 1970's than in the 1960's, for a number of reasons:

1) The population growth has begun braking.

2) The rapid economic growth of the 1960's has become a mere crawl in the 1970's.

3) The number of college students and graduates has been rapidly increasing and will continue to do so. (For most college students, this means they will be facing "buyer's" markets, as opposed to the "seller's" markets of the past decade.)

The national picture for teacher education will be analyzed prior to dealing with North Carolina's situation. Specifically, the U. S. teacher supply and demand is examined, and projections are made. Following, supply and demand for N. C. is scrutinized, along with the corresponding projections. As a state agency, the BHE has the responsibility to allocate the taxpayer's money efficiently. The performance of this duty will be aided, hopefully, by the information and analysis that follow.

SYNOPSIS:

1) Most indicators of the teaching situation in North Carolina show that elementary and secondary education will not be a "growth industry" in the 1970's. School-age population (between 6 and 18 years of age) will be declining, absolutely, as the 1980's approach, as will student enrollments at elementary and secondary levels.

2) The rate of growth in the demand for teachers will, in all probability, be falling due to declining school enrollments. The number of teachers employed in North Carolina in 1970 totaled 53,769 or about 40 percent greater than the total employed in 1960. By 1980, about 57,100 teachers will be employed, only a 6 percent increase over 1970 levels.

3) The supply of new graduates from N. C. colleges and universities prepared to teach will be rising throughout the 1970's, if past trends continue. In 1970-71, about 7,751 graduated from N. C. colleges and universities who were qualified for a North Carolina "A" certificate. This figure will be around 9,100 in 1975-76, and about 10,000 in 1979-1980.

4) Re-entry patterns of former teachers who wish to teach once again cloud the total supply picture. The wages paid to teachers, relative to that paid other workers, will be a major determinant in the decision to enter teaching. This relative wage is expected to remain constant throughout the 1970's, but any changes in it will probably cause repercussions in the teacher supply pool.

5) Areas where "surpluses" have been identified should be observed closely, and proliferation of programs which would add to the "over-supply" should not be allowed.

6) Changes in college curricula, designed to offer "career alternatives" to students, should be examined and studied.

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The so-called shortage of elementary and secondary teachers, the largest professional group in the U.S., came to an end at the conclusion of the 1960's. In fact, by April, 1970, the Monthly Labor Review, published by the U. S. Department of Labor, had announced that:

> "The aggregate supply (of elementary and secondary teachers) is expected to significantly exceed demand if recent entry patterns into the occupation continue."

According to their estimates for the 70's, 4.2 million teachers would enter the market, with only 2.4 million new openings to fill in teaching. These figures indicate that alarming talk of the "teacher shortage" is no longer justified by the facts. Indeed, in the next decade, supply will not only equal projected demand, but, also, the projected need, as outlined by the National Goals Commission in Washington, D. C. (See page 9 of this study for definitions of need, supply, and demand.)

The explanation for this abundance is two-fold:

1) Lower birth (and fertility) rates

2) Greater number of college graduates

The combination of these two factors resulted in the current situation with the lower birth rates causing decreased enrollments and the greater numbers of college graduates increasing the supply of teachers.

Student enrollment in public and non-public elementary and secondary schools increased by over 22 percent in the 1960's. Secondary enrollment increased by 54 percent while elementary enrollment rose by 8 percent, (See Table 1). Enrollment at the secondary level is expected to continue

TABLE 1. PROJECTIONS FALL ENROLLMENT, ELEMENTARY, SECONDARY, AND TOTAL (PUBLIC AND NON-PUBLIC), 1959 to 1979 (In 000's)

School Year	Total Public and Nonpublic			Public			Nonpublic (Estimated)		
	K-12	Elementary	Secondary	K-12	Elementary	Secondary	K-12	Elementary	Secondary
1959-60	40,782	28,506	12,276	35,182	23,906	11,276	5,600	4,600	1,000
1960-61	42,191	29,150	13,051	36,291	24,350	11,931	5,900	4,800	1,100
1961-62	43,364	29,403	13,961	37,464	24,603	12,861	5,900	4,800	1,100
1962-63	44,849	30,164	14,685	38,749	25,264	13,485	6,100	4,900	1,200
1963-64	46,487	30,775	15,712	40,187	25,775	14,412	6,300	5,000	1,300
1964-65	47,716	31,221	16,495	41,416	26,221	15,195	6,300	5,000	1,300
1965-66	48,473	31,570	16,904	42,173	26,670	15,504	6,300	4,900	1,400
1966-67	49,339	32,005	17,334	43,039	27,105	15,934	6,300	4,900	1,400
1967-68	49,891	31,972	17,919	43,891	27,372	16,519	6,000	4,600	1,400
1968-69	50,744	31,763	18,981	44,944	27,363	17,581	5,800	4,400	1,400
1969-70	51,319	31,755	19,563	45,619	27,455	18,163	5,700	4,300	1,400
1970-71	51,600	31,500	20,100	45,900	27,300	18,700	5,700	4,200	1,500
1971-72	51,600	30,900	20,700	46,100	26,800	19,300	5,500	4,100	1,400
1972-73	51,500	30,300	21,200	46,100	26,300	19,800	5,400	4,000	1,400
1973-74	51,300	29,600	21,800	45,900	25,600	20,400	5,400	4,000	1,400
1974-75	51,200	29,000	22,200	45,800	25,000	20,800	5,400	4,000	1,400
1975-76	51,000	28,500	22,400	45,600	24,500	21,000	5,400	4,000	1,400
1976-77	50,900	28,300	22,600	45,500	24,300	21,200	5,400	4,000	1,400
1977-78	50,800	28,300	22,500	45,400	24,300	21,100	5,400	4,000	1,400
1978-79	50,900	28,600	22,300	45,500	24,600	20,900	5,400	4,000	1,400
1979-80	51,000	29,100	21,800	45,600	25,100	20,400	5,400	4,000	1,400

Source: Projections of Educational Statistics to 1979-80, (USOE, 1970), p. 21.

Note: Figures under double lines are projections

increasing during the early 70's. This is because birth rates were quite high, relatively, during the 50's and early 60's, and the secondary enrollment will reflect the high rates. Secondary enrollment, however, will peak during the 70's and will start to decline as the 80's near.

Enrollment at the elementary level is expected to stabilize in the early 1970's and to decline as the 1980's near. This is primarily due to the advent of more efficient birth control methods, and, hence, lower birth rates in the 1960's. Although fertility rates (live births/number of women 15 to 44 years of age, see Appendix) have recently been low, and are predicted to be lower, no dramatic decrease in numbers will follow, as there will be more young women in the child-bearing ages during the 1970's. Lower fertility, however, is expected to offset the rise in number of young women in this age group.

Along the same lines, school-age population (5 to 17) is expected to decline over the next 10 to 15 years, (see Table 2). This will affect school enrollments, as the percent of students enrolled of the school-age population is already quite high (98 percent) and will not increase considerably. By 1980, for instance, the school-age population is expected to be about 48 million, or 10 percent less than in 1970. This decrease in the relevant population will, in turn, affect the demand for elementary and secondary teachers, as will be shown in the following section.

TABLE 2. NATIONAL FALL SCHOOL ENROLLMENT (K-12, PUBLIC AND NON-PUBLIC) AND SUPPLY FOR POPULATION

School Year	(In 000's) School Age Population (5-17)	(In 000's) Total Enrollment	Percent Of School Age That Is Enrolled
1960-61	45,074	42,181	94
1961-62	45,660	43,464	95
1962-63	47,062	44,849	95
1963-64	48,474	46,667	96
1964-65	49,661	48,016	97
1965-66	50,212	48,773	97
1966-67	51,004	49,339	97
1967-68	51,737	49,891	97
1968-69	52,380	50,761	97
1969-70	52,341	51,200	97
1970-71	52,988	51,600	98

		A. P.	USOE
1971-72	52,820	50,783	51,600
1972-73	52,462	51,400	51,500
1973-74	51,952	50,900	51,300
1974-75	51,430	50,400	51,200
1975-76	50,760	49,700	51,000
1976-77	50,140	49,100	50,900
1977-78	49,590	48,600	50,800
1978-79	49,080	48,100	50,900
1979-80	48,480	47,500	51,000
1980-81	47,760	46,800	51,400

Source: Projections of Educational Statistics to 1979-80, (USOE, 1970); Bureau of The Census, "Current Population Reports," Series P-25, D and E Series; and Art Padilla.

Note: Figures below double lines are projections. Based on series D and E of The Bureau of The Census, the author generated the projections for the school-age population (5-17). It is obvious that the USOE school enrollment projections appear too high, relative to recent Census information, hence the reason for the author's version of future fall school enrollments. Differences are quite evident between the NEA series on fall school enrollment and the USOE series. Therefore, the percent of school age that is enrolled would vary depending upon which series is used. The USOE series was used because it included non-public school estimates, and the NEA does not. The same applies to the computation of student-teacher ratios (see Table 3).

NATIONAL TEACHER SUPPLY AND DEMAND:

Before analyzing in detail the national supply and demand trends, it would be useful to define some concepts. Demand and need, as used throughout this analysis, are not necessarily the same. Some may say, for instance, that the U. S. demands too much chemical warfare research relative to the need for such controversial research. Thus, demand will be used in a quasi-economic sense (no wages mentioned), and refers to the existence of places and funds to employ persons. Need will be used in the social sense of the predicted number which would be required to accomplish a given goal or ideal. Supply will mean the number available, from a variety of sources, to fill vacant slots. Since no mention of wages will be made, supply and demand will be quasi-economic concepts. If the relative wage of teachers changes from present levels, supply and demand would be affected. For example, if teachers' wages decline relative to that of other workers, less services will be supplied by teachers (who would likely shift to other jobs), and more will be demanded by employers (who would have to pay relatively less for the same services). Consequently, it is assumed that the relative wage of teachers will remain unchanged in the future.

NATIONAL DEMAND:

The actual number of elementary and secondary teachers employed in the U.S. school systems sheds much light on present and future supply-demand balance. Similarly, student-teacher ratios are quite helpful in estimating future teacher demand. The student-teacher ratio can be computed using various base enrollments. For instance, average daily membership figures could serve as the numerator, as could the fall enrollment figures, or the

average daily attendance figures (see Estimates of School Statistics, 1970-71, NEA Research Report, for definitions of various measures). In this analysis fall school enrollment was used as the numerator, since the available teacher data is also recorded in the fall of each year, and was not adjusted for daily attendance. (Incidentally, the ratio of fall school enrollment to cumulative school enrollment has remained quite constant for the past ten years, so trends would not be biased with the use of either measure).

The time-series on U.S. elementary and secondary teacher employment, as well as student-teacher ratios, is shown in Table 3. The figures indicate that the rate of annual growth in teachers' employment is definitely decreasing. During the first half of the 1960's teacher employment grew by about 23 percent (over 1960 levels), whereas teacher employment rose by about 17 percent (over 1965 levels) during the second half of the 1960's. The number of elementary teachers employed in 1970 was 32 percent greater than that in 1960, while the number of secondary teachers rose 75 percent over the same time period. As was the case for the total system, the rate of annual increase in employment in each category was greater during the first half of the 1960's than during the second half.

Student-teacher ratios for the entire system have fallen over the 1960's. These ratios, however, have not decreased substantially in recent years. This would indicate that, ceteris paribus, the ratios will not change considerably in the future. Projections of future teacher demand reflect this downward inflexibility of the ratios. As depicted in Table 3, by 1979-80, total teacher demand will be only slightly greater (31,000 teachers more) than

TABLE 3. ELEMENTARY AND SECONDARY TEACHERS (PUBLIC AND NON-PUBLIC) IN THE US AND STUDENT-TEACHER RATIOS
(In 000's)

School Year	Elementary Teachers	Elementary S/T	Secondary Teachers	Secondary S/T	Total Teacher Demand	Total S/T
1959-60	952	29.9	580	21.2	1,531	26.6
1960-61	991	29.4	609	21.4	1,600	26.4
1961-62	1,015	29.0	653	21.5	1,668	26.0
1962-63	1,036	29.1	690	21.3	1,727	26.0
1963-64	1,062	29.0	743	21.1	1,806	25.7
1964-65	1,096	28.5	786	21.0	1,882	25.4
1965-66	1,122	28.1	828	20.4	1,951	24.8
1966-67	1,167	27.4	866	20.0	2,032	24.3
1967-68	1,193	26.8	895	20.0	2,087	23.9
1968-69	1,223	26.0	938	20.2	2,162	23.5
1969-70	1,255	25.3	985	19.9	2,241	22.9
1970-71	1,261	25.0	1,014	19.8	2,275	22.7
1971-72	1,247	24.8	1,041	19.9	2,289	22.5
1972-73	1,229	24.7	1,067	19.9	2,295	22.4
1973-74	1,208	24.5	1,095	19.9	2,303	22.3
1974-75	1,192	24.3	1,114	19.9	2,306	22.2
1975-76	1,180	24.2	1,126	19.9	2,305	22.1
1976-77	1,175	24.1	1,133	19.9	2,308	22.1
1977-78	1,180	24.0	1,130	19.9	2,311	22.0
1978-79	1,192	24.0	1,123	19.9	2,316	22.0
1979-80	1,217	23.9	1,104	19.7	2,320	22.0

Source: "Projections of Educational Statistics to 1979-80," USOE, 1970; "Estimates of School Statistics, 1970-71," Research Division, NEA, 1970; and A. Padilla.

Note: Figures below double lines are projections.

teacher demand in 1971-72. Demand for elementary teachers will actually decrease by the end of the 70's, reflecting, partially, the lower school-age population expected in the future, and, also, the shift of public seventh and eighth grade pupils from elementary to secondary junior high schools. The figures indicate a small increase in elementary teacher demand in the late 70's (1977-80), although 1970-71 levels will not be reached. This is explained partly by a recent leveling in fertility rates, which had shown a steady downward movement over the last ten years. (See Appendix for a brief discussion of variables affecting population growth).

As implied above, the downward rigidity of the student-teacher ratio suggests (at least) two things:

1) Lack of reduction in this ratio will necessarily mean a decreased demand for teachers, given predicted enrollment trends for the 1970's (see Table 1).

2) Further reduction in the ratio seems unlikely, given current economic conditions and public sentiment.

The future behaviour of student-teacher ratios, then, is quite important. If the student-teacher ratio could be reduced drastically (and this would imply something about teachers' relative wages, for some teachers would have to be coaxed, economically, to leave their present employment alternatives) talk of a "surplus" of teachers would be unjustified. But the likelihood of such a reduction in the ratio, in view of the present economic situation and of public disappointment with taxation, is not very high. Hence, it is talk about drastic reductions in student-teacher ratios (which would raise the instructional cost per student) which is, currently, unreasonable.

National Demand for New Teachers

If the concept "additional or new teachers" can be defined to include those elementary and secondary teachers hired in a given year (say year "t") not employed in schools the previous year (or year "t-1"), then the demand for additional (or new) teachers can be partitioned three ways:

1) demand resulting from teacher turnover, or replacement requirements;

2) demand resulting from enrollment growth;

3) demand resulting from new programs and from student-teacher ratio changes.

In the past, replacement demand for teachers who have retired, died, or otherwise left the teaching profession has been about 65 percent of the total new demand annually or about 8 percent annually of the total (new and old) demand (see Table 4). It has been high, relative to other industries, because of the large number of women employed, and their work habits. Moreover, since industries that employ a large portion of women typically pay low wages, the male turnover rate in teaching has also been quite high. About 16 percent of the annual total new demand has been due to student-teacher ratio changes, and 18 percent due to enrollment increases. As school enrollments decline in the next decade, the demand for new teachers to meet enrollment growth will diminish, and even become negative. There is no need to remind a mathematically-oriented audience that a diminishing (or negative) rate of growth for the total system implies a declining absolute demand for new teachers to meet the increases in enrollment. This means, quite simply, that if school enrollment ceases to grow, as expected, the only source of employment for new teachers will come from the need to replace those who leave the system in any manner.

The additional or new demand created by new programs is, in a word, uncertain. An unanticipated policy change can cause great fluctuations in the new demand component. Most projections are made, and the ones presented here are, with the assumption that policy variables are exogenous, and, as such, are under control outside the system. Consequently, the effect of new programs on demand is not specifically known. For example, what will be the effect on teacher demand if the compulsory attendance age range of students is narrowed? Or, what will be the effect of a state-supported nursery program? These questions, generally, cannot be answered without further information.

During the 1960's new college graduates (who graduated the previous school year, or who graduated in other years, but have never taught) have filled about 75 percent of the new demand each year. The remaining 25 percent has been filled annually by experienced returnees (former teachers not employed the preceding year). About 205,000 new teachers (teachers not employed in teaching the previous year) were demanded in 1970-71. Of this total about 17,000 were required due to enrollment growth; 18,000 due to pupil-teacher ratio changes; and 170,000 due to teacher turnover. Moreover, this new demand of 205,000 was filled by about 148,000 new college graduates and 57,000 experienced returnees. As seen in Table 4, the total new demand will be 173,000 at the close of the 70's, or 13,000 less than in 1971. Accordingly, the positions to be filled by new college graduates will fall from 148,000 in 1970 to an estimated 128,000 in 1979.

Table 4. Estimated New Demand for Certificated Classroom Teachers in U. S. Public and Non-public Schools

Year (Fall)	Demand Filled by New College Graduates	Demand Filled by Experienced Returnees	Total New Demand	For Enrollment Growth	For Pupil-Teacher Ratio Changes	For Teacher Turnover	Total Teacher Demand
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1965	156,743	52,247	208,990	29,832	36,303	140,855	1,950,319
1966	172,309	57,436	229,745	39,811	43,108	146,826	2,032,233
1967	156,068	52,022	208,090	30,180	24,771	153,139	2,087,129
1968	173,668	57,889	231,557	42,285	31,857	157,415	2,161,331
1969	181,808	60,603	242,411	31,944	46,561	163,906	2,240,836
1970	148,000	57,000	205,000	17,000	18,000	170,000	2,275,000
1971	135,000	52,000	187,000	7,000	7,000	173,000	2,289,000
1972	130,000	50,000	180,000	-1,000	7,000	174,000	2,295,000
1973	130,000	49,000	179,000	-3,000	7,000	175,000	2,303,000
1974	134,000	44,000	178,000	-3,000	6,000	175,000	2,306,000
1975	131,000	44,000	175,000	-7,000	6,000	175,000	2,305,000
1976	134,000	44,000	178,000	-4,000	7,000	175,000	2,308,000
1977	134,000	44,000	178,000	-3,000	6,000	175,000	2,311,000
1978	128,000	44,000	172,000	-2,000	3,000	171,000	2,316,000
1979	128,000	45,000	173,000	1,000	2,000	170,000	2,320,000

Source: Projections of Educational Statistics to 1979-80, (USOE, 1970), pp. 61-63, and A. Padilla.

Note: Columns (1) and (2) should add up to column (3). Also, columns (4), (5), and (6) should add up to column (3). Column (7) represents total demand in a given year, including column (3).

Figures below double lines are projected.

NATIONAL SUPPLY:

The potential supply of entrants to the teaching profession is a variable concept. Quantification of the stock of teachers is difficult because of the numbers of married women employed in teaching, who may leave to be housewives, and then return after a given time interval. Furthermore, the returning teachers represent a considerable source of supply, and variables affecting the decision to reenter teaching are many. For example, the relative wage of teachers is a factor in the decision process, as is the availability of other jobs. There exists some data which may confirm the belief that during prosperous times (i.e. when the economy is "booming"), more teachers seek non-teaching jobs. According to annual NEA surveys, the percent of college graduates (prepared to teach) entering teaching the year after graduation appears to be lower in periods when the economy is in a state of expansion. Contrastingly, during periods of slow economic growth and high unemployment, the percent entering immediate teaching is higher. Over the past 15 years, this percent has ranged between 74 and 64 percent, with a much higher percent of elementary teachers entering immediate employment as teachers after graduation (about 80 percent) than secondary teacher graduates (about 65 percent). (See NEA Research Report 1970-R-14, Teacher Supply and Demand in Public Schools, 1970, pp. 21-23).

National New Supply:

As in the case of new demand, the new supply of teachers can be divided into three parts:

1) former teachers who wish to teach again;

2) teacher education graduates of previous years who wish to teach for the first time;

3) new graduates of teacher education programs.

As previously mentioned, experienced returnees are a large source of supply, but quantification of the existing stock is difficult. Nonetheless, to overlook their importance would be tantamount to understating the existing supply. The same applies to the supply graduates of previous years who wish to teach for the first time. This leaves the new graduates of teacher education programs. It is this component of new supply which is identifiable. Table 5 shows past trends and projections of earned degrees in US colleges and universities. According to projections, nearly 60 percent more degrees (bachelor's and master's) will be conferred in 1979-80 than were in 1969-70. A similar increase, ceteris paribus, will occur in the number of total college graduates prepared to teach elementary and secondary students. In the past, about one-third of all college graduates have been prepared to teach, although not all entered the profession directly, for various reasons.

Adjustments can be made to arrive at the approximate number of new college graduates which will constitute that part of new supply, since not all will enter teaching. If these figures are divided by the predicted new demand to be filled by new college graduates (see Table 4), the resulting ratio could serve as an indication of how the adjusted new supply compares, and will compare, with the demand filled by new college graduates.

The "supply-demand ratio" (with new supply in the numerator) indicates "shortages", "surpluses" or some form of equilibrium between supply and demand, depending on its value. Roughly, if the ratio is less than one (1), then supply is less than demand; if it is equal to one (1), then supply and

Table 5. Earned Degrees Awarded and College Graduates Prepared to Teach, Bachelor's and Master's, 1960-1961/1970-1980

YEAR	EARNED DEGREES, BACHELOR'S & MASTER'S	TOTAL COLLEGE GRADUATES PREPARED TO TEACH, BACHELOR'S & MASTER'S	(ELEMENTARY TEACHING)	(SECONDARY TEACHING)
1960-61	480,053	129,188	(51,866)	(77,322)
1961-62	505,374	142,343	(57,854)	(84,489)
1962-63	542,010	158,357	(61,979)	(96,378)
1963-64	603,226	174,133	(72,581)	(101,552)
1964-65	651,125	191,391	(74,964)	(116,427)
1965-66	696,385	204,918	(77,703)	(127,215)
1966-67	752,754	227,088	(83,483)	(143,605)
1967-68	848,741	241,504	(91,336)	(150,168)
1968-69	964,097	275,028	(103,654)	(171,374)
1969-70	1,003,200	301,027	(109,888)	(191,139)
1970-71	1,071,500	310,900	(112,900)	(198,000)
1971-72	1,113,400	325,670	(118,200)	(207,470)
1972-73	1,168,700	341,800	(123,700)	(218,100)
1973-74	1,221,500	357,300	(128,300)	(229,000)
1974-75	1,284,200	375,600	(133,700)	(241,900)
1975-76	1,343,400	392,900	(138,700)	(254,200)
1976-77	1,406,700	411,500	(144,000)	(267,500)
1977-78	1,465,300	428,600	(148,700)	(279,900)
1978-79	1,526,200	446,400	(153,100)	(293,300)
1979-80	1,565,500	457,900	(155,700)	(302,200)

Note: Figures below double lines are projected.

Source: "A Fact Book on Higher Education," ACE, Fourth Issue, 1970, (Earned Degrees), p. 189; "Teacher Supply and Demand in Public Schools, 1970," NEA - Research Division, 1970, p. 14.

demand are in equilibrium; and if it is greater than one (1), then supply is greater than demand. The actual and projected values of this ratio are shown in Table 6.

TABLE 6. NATIONAL SUPPLY-DEMAND RATIOS, 1965-1980

Year	Supply-Demand Ratio	Adjusted Supply-Demand Ratio
1965-66	1.31	.94
1966-67	1.32	.92
1967-68	1.55	1.09
1968-69	1.58	1.07
1969-70	1.66	1.13
1970-71	2.10	1.47
1971-72	2.41	1.74
1972-73	2.63	1.89
1973-74	2.69	1.93
1974-75	2.80	2.02
1975-76	3.00	2.16
1976-77	3.07	2.21
1977-78	3.20	2.30
1978-79	3.49	2.51
1979-80	3.58	2.58

Source: A. Padilla

Note: New supply was adjusted for those new graduates who do not enter teaching the year after graduation in the "Adjusted" column. See NEA Research Report 1970-R, p. 21 for the percents used in the adjustment. Figures below double lines are projections.

The obtained ratios are consistent with national surveys conducted by the USOE and NEA in indicating that the general "shortage" of elementary and secondary teachers had come to an end in the late 1960's. The adjusted supply-demand ratio reaches unitary value (1) around the date when most surveys indicate the alleviation of the "shortage." If the relevant variables (such as supply of new teachers, student enrollment, birth rates) continue pari passu, then serious "surpluses" will ensue.

Supply and Demand in Specific Areas:

The demand and supply situation for most areas of instruction shows a relief of past shortages. For certain areas, however, shortages still exist at the current wages being paid. The annual new demand in certain fields, as measured by the number of new teachers employed, exceeded the annual supply of new teacher education graduates. This means, then, that if even 100 percent of the new graduates had been willing to enter teaching, the demand would not have been met by new graduates alone. Some of this demand, of course, is met by re-entrants to the teaching profession. Even these specific shortages, however, are not likely to persist in the future, particularly if turnover rates decrease, as they tend to do during slow economic years. Lower turnover rates would lead to lower replacement demand, which, in turn, would alleviate these specific areas where shortages now exist.

Frequently cited academic areas where "shortages" exist include the natural and physical sciences, mathematical sciences, trade and industrial education, and library science. Below is an NEA table (Table 7) which estimates supply and demand conditions for various fields. It is interesting to note that only 41 percent of teacher education graduates in the trade and

ble 7. Summary of Estimated Supply Compared with the Estimate of Demand for Beginning Teachers in 1970, Elementary-school and Secondary-school Subject Areas.

Area	Difference in the estimated supply of beginning teachers and estimated demand based on: Percent distribution in 1969	Difference in the estimated supply of beginning teachers and estimated demand based on: National Estimate	Percent of teacher education graduates entering the profession	Estimated additional supply if 80.0 percent of graduates entered	Additional demand if estimated re-entry rate is reduced by 10%	General condition
1	2	3	4	5	6	7
Mathematics	-1,266	-3,900	71.2%	605	356	Shortage
Trade, industrial, vocational, technical .	-781	-656	41.0	37	46	Shortage
Natural and physical sciences	+249	-2,592	63.9	612	308	Low supply
Industrial arts	996	255	70.2	260	100	Low supply
Special education						
Elementary	1,406	2,646	68.3	...	98	Near balance
Secondary	1,142	2,400	68.3	...	68	
Distributive education	204	...	69.1	29	8	Near balance
Agriculture	658	816	52.7	96	27	Adequate supply
Art						
Elementary	588	590	57.4	...	28	Adequate supply
Secondary	3,315	2,760	63.2	367	76	Adequate supply
Business education ...	3,814	3,321	58.6	541	149	Adequate supply
Elementary, regular instruction	35,946	12,508	74.5	...	3,208	Adequate supply
English language arts	7,082	2,490	63.5	1,631	599	Adequate supply
Foreign languages						
Elementary	284	146	77.0	...	4	Adequate supply
Secondary	3,526	2,385	59.7	522	149	Adequate supply
Home economics	3,132	2,312	59.2	402	109	Adequate supply
Music						
Elementary	-444	447	64.8	...	88	Adequate supply
Secondary	2,866	2,806	69.8	389	103	Adequate supply
Physical and health education						
Elementary	-202	-200	70.5	...	84	Adequate supply
Secondary--Men.....	5,077	7,199	65.1	597	134	Adequate supply
Women	3,040	2,245	68.5	388	96	Adequate supply
Social studies	16,218	14,054	55.2	1,802	373	Adequate supply

Source: "Teacher Supply and Demand in Public Schools, 1970," NEA Research Report, p. 48.

industrial education enter that profession. Similarly, 71 percent of the mathematics graduates enter that profession. Why these ratios are low (if, in fact, they are low) is a purely speculative matter. One could hypothesize, for instance, that the wages paid to certain professionals in teaching are not comparable to what they could obtain outside teaching. Thus, if the wage mathematicians, say, could earn in teaching is less than the wage they could earn in their next best alternative, then there exists a plausible explanation for the low percent entering the profession. This argument would apply to all professions, and might point to the need for differential pay scales to alleviate "shortages" in some teaching areas. Areas of "shortage" or "surplus" could be defined with the help of the adjusted supply-demand ratios, discussed in the previous section of this paper. The national adjusted supply-demand ratios in 1969-70 for a few selected disciplines or teaching areas are presented in Table 8.

TABLE 8. SUPPLY DEMAND RATIOS FOR SELECTED AREAS, 1969-70

Area	Adjusted Supply-Demand Ratio	Unadjusted Supply-Demand Ratio
Foreign Languages (Elem.)	1.90	2.46
Home Economics (Secon.)	1.26	2.10
Physical & Health Ed. (Secon.)	1.36	2.01
Art (Secondary)	1.02	1.61
Industrial Arts (Secon.)	.80	1.14
Mathematics (Secon.)	.43	.61
Natural & Physical Sciences (Total)	.46	.72
Librarian	.39	.55
Social Sciences (Total)	.90	1.62

Source: Ratios computed by A. Padilla from "new" teacher data from NEA Research Division (Research Report 1970-R14, pp. 42-48).

Women in Teaching.

According to the USOE, the overwhelming majority of elementary teachers in the US (80 percent) are women. Moreover, nearly half of all secondary teachers are women. Men, however, predominate in the supervisory and administrative positions in both public and private schools.

The projected labor market in elementary and secondary teaching could affect women's professional aspirations in this field, as about 70 percent of all college graduates who enter teaching are women. Given the future course of college enrollments and numbers of graduates, (more than 40 percent of all bachelor's and first professional degrees were awarded to women in 1970) many young women may have to seek employment alternatives to teaching during the 1970's. If many of these same young women are almost exclusively prepared to teach, then finding alternative careers may be even more difficult. Some suggestions will be made at the end of this paper which may remedy, somewhat, this situation.

TEACHER EDUCATION IN NORTH CAROLINA

In general, North Carolina's teacher education prospects are similar to those of most of the other 49 states. Specifically, like the rest of the U.S., the Tar Heel state is faced with decreasing public school enrollment, tightening purse strings by legislators, and increasing numbers of college and university graduates. These three facts delineate, rather clearly, the problem confronting North Carolina.

THE DEMAND FOR TEACHERS IN NORTH CAROLINA

Rapid expansion took place during the 50's, and early 60's in school enrollment in North Carolina. (See Table 9). Similarly, the number of teachers employed rose quite rapidly in that time period to accomodate enrollment growth. The culprits of the increased demand for teachers were, of course, the high number of births during the 40's and 50's. (This is the cohort which has been causing, and will continue to cause, the college enrollments to soar.) In 1965, however, with the advent of more efficient birth control measures, and changing attitudes on family size, the number of births (and hence, birth and fertility rates) dropped sharply. Since 1965, the fertility rate for N. C. has continued to decline to levels witnessed only during the depressing 1930's. Public sentiment about the ecology, and "over-population," and policy changes regarding abortions threaten to reduce the rates even lower, perhaps even below the "magic" 2.11 children per woman, at which rate population growth would be halted.

From close scrutiny of related variables, it appears that the best, single indicator of school enrollment is the corresponding age-group population, for there has been little variation between school enrollment and school-age population movements. The school-age population relevant to North Carolina is

between 6 and 18 years of age, as the great majority of the enrollment lies within this range. Unfortunately, actual population data, by age, is available from The Census only every ten years, so that this age group has to be estimated for the in-between years. This can best be accomplished for North Carolina with the live birth figures reported for each year. (See Appendix). Adaptations, of course, have to be made to compensate for deaths and migration. Data on death rates, by age group, by year, is readily available (from the N. C. Board of Health) and, thus, death rate adjustments are relatively simple. In general, death rates for all age groups have been decreasing with time. Migration adjustments are somewhat more involved, as data is scarce. According to U. S. Census information, in-migration to North Carolina has been increasing relative to out-migration, and this trend has been reflected in the live-birth estimates. (As a matter of interest, the 6 to 18 year old population estimated using the adjusted live-birth technique is quite close to the decennial counts of The U. S. Census. There is about a 3-4% error in Census figures in either direction, and the estimates used here are within that range).

A time-series depicting the relationship between the 6 to 18 year old population and the fall enrollment in North Carolina public and non-public schools (grades 1-12), with corresponding projections, is shown in Table 9. Data on total public school enrollment is available from 1959-60, and public by-grade figures (see Table 10) from 1964-65.

From perusal of Table 9 it appears that the variation in the percent of the North Carolina school-age population enrolled in North Carolina public schools has been very small. For instance, in 1959-60, about 88% of the 6-18 population was enrolled in public schools, whereas in 1970-71 almost the same percent was enrolled. These percents, if used as a "proxy" of educational attainment, are misleading, for the non-public enrollment figures are not

Table 9. NORTH CAROLINA PUBLIC AND NON-PUBLIC FALL ENROLLMENTS, (GRADES 1-12), SCHOOL-AGE POPULATION, AND PROJECTIONS

School Year	Public	Non-Public	Total	School-Age Population, 6-18 yr. Old
1959-60	1,082,013	Data Not Available		1,230,580
1960-61	1,102,026	-	-	1,253,727
1961-62	1,120,372	-	-	1,271,911
1962-63	1,140,981	-	-	1,295,194
1963-64	1,167,963	-	-	1,321,225
1964-65	1,178,334	-	-	1,326,245
1965-66	1,181,552	-	-	1,333,574
1966-67	1,183,690	-	-	1,336,725
1967-68	1,193,267	18,301	1,211,568	1,342,333
1968-69	1,195,583	21,802	1,217,385	1,347,415
1969-70	1,191,576	27,471	1,219,047	1,347,018
1970-71	1,184,[illegible]8	36,624	1,221,312	1,337,155
	High	Low	High	Low		
1971-72	1,180,900	1,172,740	52,000	43,800	1,224,750	1,338,525
1972-73	1,173,800	1,157,800	54,600	39,600	1,213,400	1,322,141
1973-74	1,168,100	1,151,600	59,300	41,800	1,209,900	1,319,060
1974-75	1,161,900	1,131,500	64,600	34,200	1,196,100	1,302,909
1975-76	1,156,500	1,120,800	69,000	33,300	1,189,800	1,293,280
1976-77	1,152,200	1,109,700	73,300	30,800	1,183,000	1,286,000
1977-78	1,147,600	1,100,500	76,500	29,400	1,177,000	1,277,000
1978-79	1,143,100	1,090,700	78,300	26,900	1,169,000	1,267,000
1979-80	1,136,600	1,083,200	77,800	24,400	1,161,000	1,255,000
1980-81	1,131,900	1,076,500	78,500	23,100	1,155,000	1,243,000
1981-82	1,123,100	1,065,800	80,200	22,900	1,146,000	1,232,000

Source: N. C. Board of Education (Data Processing and Division of Non-Public Schools), and A. Padilla

Note: Total enrollment is obtained by adding "high" public and "low" non-public or by adding "low" public and "high" non-public. Projections under the "total" column assume that a moderate increase in the percent of the 6-18 population enrolled will take place.

included. Unfortunately, data on non-public schools is scarce. According to The Division of Non-Public Schools of The North Carolina Board of Education, non-public enrollment figures are available only from 1967-68, and teacher data is virtually non-existent. Reportedly, past interest in North Carolina non-public schools has been insignificant, mainly due to the relative smallness of the non-public system, and thus data requirements have not been large.

The available information (in Table 9) shows a rapid (100%) increase in non-public enrollment from 1967-68 to 1970-71, although base figures have been, indeed, a small percentage (2-3%) of the total (public and non-public) fall enrollment.

What non-public enrollment will do in future years is quite uncertain. Recent rulings on "busing" by legal courts have created much controversy in North Carolina, and may lead to a sharp increase in private enrollments in the fall of 1971. To a degree, the supply of new places in non-public schools will be fixed in the short-run, due to a lack of time to prepare for expansion, and the related expense. Consequently, private enrollment should not grow very much relative to total enrollment in the short-run. Moreover, the shift in enrollments from public to private may be a temporary phenomenom which will reverse itself after the issue of "busing" settles, and after parents become aware of the difference in costs (to them) between a public and a non-public education. In any event, total (public and non-public) enrollments will decline over the 1970's, as will the increase in teacher demand. It is the future behaviour of public vs. non-public enrollments which may cause some difficulties in trying to predict enrollments in each sector.

Since the total stock of potential students is relatively fixed in any given year, it is only the mix between public and non-public which can vary. Hence, there exist two plausible sets of projections (see Table 9) that can be made for the total (public and non-public) system. One would assume that enrollment will shift from the public to the private sector, and the other, the reverse. (These are purely pedagogic exercises for, as mentioned above, the future course of the total system is the most relevant matter. According to the Division of Non-public Schools, however, information on non-public school projections is wanting and, therefore, any additional data would be a public service).

The availability of relatively more data for the public sector (see Table 10) enables the generation of more detailed projections for that sector. Given the N. C. population 6 to 14 years old, public elementary enrollments can be predicted. Similarly, secondary enrollments can be projected (see Table 11). Elementary public enrollment in N. C. is expected to be at a lower level in 1981-82 (850,080 students) than during any year in the 1960's. By 1981-82, public secondary enrollment will be at about the same level of 1963-64. (These projected values for the public sector implicitly assume a relatively stable public/non-public situation.) Figure 1 shows past trends in public enrollment and its expected future course.

North Carolina's percent of the school-age population enrolled in schools has, historically, been lower than the U.S. average. N. C.'s rate is estimated at 91 percent, while the U.S. average is near 98 percent. (According to a Carnegie Commission study, incidentally, The Capitol and the Campus, 1971, North Carolina was one of only six states where less than 70 percent of the ninth

Table 10

YEARLY FALL ENROLLMENT, BY GRADE, IN N. C. PUBLIC SCHO

	1	2	3	4	5	6	7	8	Elem Spec Educ	9
1964--65	110,851	108,853	106,442	104,725	104,089	101,410	101,571	96,968	11,984	94,9
1965--66	111,698	106,844	107,000	104,985	103,347	104,212	101,660	97,828	13,403	98,1
1966--67	110,296	106,854	104,652	105,341	103,545	103,750	102,858	97,530	15,022	99,7
1967--68	112,292	105,788	105,166	103,432	103,840	102,949	102,861	100,798	15,700	100,5
1968--69	110,418	106,292	103,588	103,194	102,280	102,506	102,813	100,295	16,116	102,9
1969--70	107,267	104,564	103,852	101,572	101,551	100,859	102,816	101,230	16,187	102,0
1970--71	104,742	101,524	101,596	101,927	99,870	100,814	101,692	100,714	15,361	102,6

Source: N. C. Board of Education, Data Processing (Bill Kurdys).

Y FALL ENROLLMENT, BY GRADE, IN N. C. PUBLIC SCHOOLS

5	6	7	8	Elem Spec Educ	9	10	11	12	H.S. Spec Educ	Grand Total
104,089	101,410	101,571	96,968	11,984	94,936	88,363	76,604	70,725	558	1,178,134
103,347	104,212	101,660	97,828	13,403	98,170	86,766	75,766	69,117	754	1,[illegible],558
103,545	103,750	102,858	97,530	15,022	99,741	89,825	75,154	67,871	1,251	1,[illegible],690
103,840	102,949	102,861	100,798	15,700	100,514	92,306	78,051	67,554	2,016	1,[illegible],367
102,280	102,506	102,813	100,295	16,116	102,907	93,114	79,689	69,925	2,446	1,[illegible],583
101,551	100,859	102,816	101,230	16,187	102,086	95,015	80,503	71,276	2,798	1,[illegible],576
99,870	100,814	101,692	100,714	15,361	102,688	96,355	82,477	72,147	2,781	1,[illegible],688

sing (Bill Kurdys).

Figure 1. N. C. SCHOOL AGE POPULATION AND PUBLIC SCHOOL ENROLLMENT

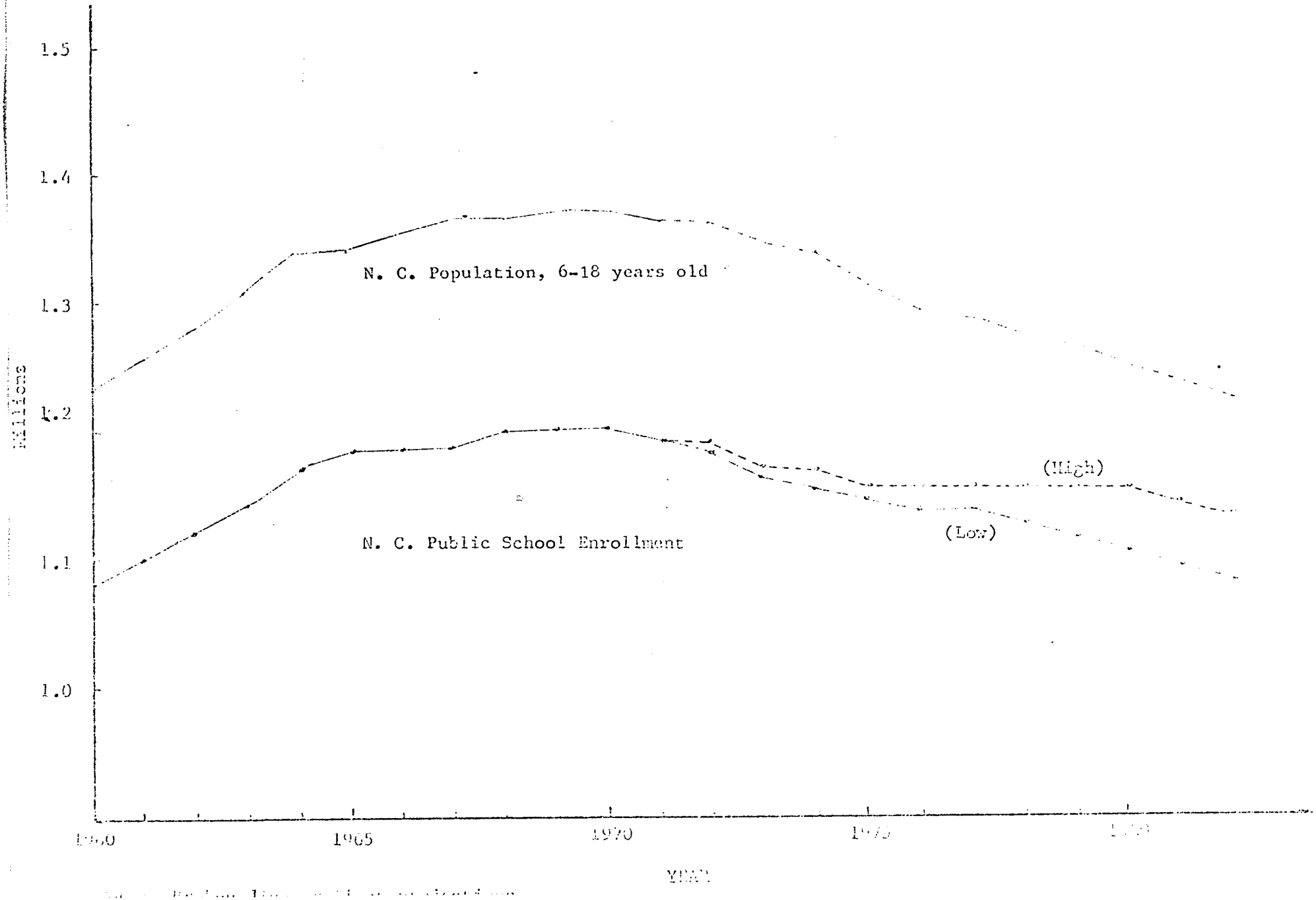


Table 11.

N. C. ELEMENTARY AND SECONDARY PUBLIC SCHOOL FALL ENROLLMENT, ACTUAL AND PROJECTED, AND SCHOOL-AGE POPULATION, 1959/60-1981/82

YEAR	N. C. POPULATION 6 to 14 years old	FALL ENROLLMENT ELEMENTARY-SCHOOL TOTAL	N. C. POPULATION 15 to 18 years old	FALL ENROLLMENT HIGH SCHOOL TOTAL
1959-60	904,473	816,700	326,104	265,400
1960-61	917,728	829,800	335,999	274,600
1961-62	919,591	834,000	352,320	288,500
1962-63	924,766	838,800	370,426	303,500
1963-64	927,045	844,900	389,762	322,700
1964-65	931,463	846,893	399,200	331,241
1965-66	933,501	850,979	400,072	330,573
1966-67	934,370	849,348	402,354	333,842
1967-68	935,606	852,826	406,727	340,441
1068-69	931,063	847,502	416,351	348,081
1969-70	926,748	839,898	420,270	351,678
1970-71	911,939	828,240	425,215	356,448
1971-72	906,181	819,200	432,344	362,300
1972-73	892,445	809,000	429,696	360,500
1973-74	889,040	803,700	430,014	361,200
1974-75	876,857	798,000	426,051	357,900
1975-76	867,793	793,200	425,491	357,800
1976-77	861,620	792,700	424,380	357,300
1977-78	853,036	789,900	423,964	358,200
1978-79	845,089	787,600	421,911	357,800
1979-80	844,615	793,900	410,385	348,800
1980-81	847,726	796,900	395,274	337,200
1981-82	850,080	799,100	381,920	326,500

Source: N. C. Board of Education and A. Padilla

Note: Elementary and Secondary figures were estimated by the author for 1959-60 through 1963-64. If added, the resulting figures may not equal actual total enrollment due to rounding off. Also, projected values for elementary and secondary enrollments, if added, may not be exactly equal to projected values of the total system. They fall, generally between the "low" and "high" projections made previously for the entire system. (See Table 9). Population figures were estimated by the author. Figures below double lines are projections.

grade students graduate from high school. Only Georgia was lower. This gives support to the belief that N. C.'s attrition rate from high schools is much greater than the average U.S. rate, thus partly explaining N. C.'s lower percent enrolled.)

Because the portion of N. C. 6 to 18 year olds that is enrolled in N. C. schools is less than the U.S. average, three projections are presented in Table 12 for total fall enrollment. The "low" projection assumes an almost constant percent of school-age population enrolled. The "high" projection assumes that this percent will rise at a much faster rate than it has during the past decade. As can be seen, the difference between "high" and "low" in Table 12 is not large (only 50,000 in 1981-82). All three projections reach a maximum value in 1971-72, and decrease as the 1980's approach.

The implications expected decreased enrollments have, inter alia, for teacher demand are readily obvious in Table 13. Estimated total teacher demand grew by nearly 40 percent during the 1960's in N. C. It is expected to grow only 6 percent during the 1970's, assuming a moderate, or about 10 percent, decrease in the total pupil-teacher ratio. That student-teacher ratios will decrease more than assumed in Table 13 is unlikely, for reasons previously stated, (see page 12). It is plausible, however, that new programs or other unanticipated changes will cause shifts in demand for teachers, hence affecting the future course. It is not likely that any such change will alter the course so that trends and implications presented here will be irrelevant to the N. C. teacher situation. For instance, if student-teacher ratios are allowed to decrease by one-fourth of their 1970 values, (an unprecedented and costly decrease), and "high" enrollment estimates are used; about 65,000 teachers will be employed in N. C. schools by 1982. This represents about a 25 percent increase from 1970 levels. But this

Table 12. Actual and Projected Fall Enrollments in North Carolina Schools, (Public and Non-Public), Grades 1-12, 1959/60 - 1981/82.

Year	Total Fall Enrollment		
1967-68	1,211,568		
1968-69	1,217,385		
1969-70	1,219,047		
1970-71	1,221,312		
	High	Medium	Low
1971-72	1,227,430	1,224,750	1,223,410
1972-73	1,219,020	1,213,400	1,209,760
1973-74	1,220,130	1,209,900	1,208,260
1974-75	1,211,700	1,196,100	1,193,500
1975-76	1,209,200	1,189,800	1,185,900
1976-77	1,208,000	1,183,000	1,179,000
1977-78	1,204,000	1,177,000	1,172,000
1978-79	1,200,000	1,169,000	1,163,000
1979-80	1,194,000	1,161,000	1,153,000
1980-81	1,188,000	1,155,000	1,142,000
1981-82	1,183,000	1,146,000	1,133,000

Source: N. C. Board of Education and A. Padilla.

Note: The three projected columns assume different percents of the 6-18 population will be enrolled in all North Carolina schools. (See Table 9 for 6-18 year olds data). Figures below double lines are projected.

Table 13. NORTH CAROLINA TOTAL TEACHER DEMAND (PUBLIC AND NON-PUBLIC) 1959/60-1981/82

Year	Total Teacher Demand	Total Public Demand		Total Non-Public Demand	
1959-60	Data Not Available	37,312		Data Not Available	
1960-61	"	37,935		"	
1961-62	"	40,014		"	
1962-63	"	41,387		"	
1963-64	"	43,453		"	
1964-65	"	44,823		"	
1965-66	"	46,283		"	
1966-67	"	48,754		"	
1967-68	50,762	49,687		1,075*	
1968-69	52,104	50,824		1,280*	
1969-70	53,128	51,503		1,625*	
1970-71	53,769	51,604		2,165	
		High	Low	High	Low
1971-72	54,430	51,800	51,440	2,990	2,630
1972-73	54,650	52,000	51,480	3,170	2,640
1973-74	54,740	52,380	51,290	3,450	2,490
1974-75	54,900	52,970	51,120	3,780	2,040
1975-76	55,030	52,790	50,970	4,060	2,010
1976-77	55,480	53,330	51,170	5,310	1,960
1977-78	55,600	53,600	51,100	4,500	1,800
1978-79	55,800	54,000	51,200	4,600	1,700
1979-80	55,800	54,400	51,200	4,600	1,400
1980-81	55,800	54,600	51,200	4,600	1,350
1981-82	57,100	55,600	52,400	4,700	1,350

Source: North Carolina Board of Education and A. Padilla.
Note: Figures with asterisks were estimated by the author based on non-public enrollments for those years. Projections for total teacher demand assume a moderate (10%) decrease in pupil-teacher ratio. Summing "high" public and "low" non-public should approximate total teacher demand in any given year. Figures below double lines are projected.

increase of 25 percent is still 15 percent less than the increase in teacher employment during the 1960's. Regardless of the assumptions underlying projections, it is improbable that the reduced enrollments expected will mean anything but reduced demand for inputs (i.e., teachers, buildings, supervisors).

N. C. Demand for New Teachers:

The concept of "new" teachers for N. C. is identical as the national "new" teacher concept, previously discussed (page 13). To reiterate, new teachers include those elementary and secondary teachers hired in a given year, but not employed in schools the previous year. The various components of new demand are estimated for N. C. in Table 14.

As can be seen, new demand for teacher turnover has been the major constituent of total new demand. This will become more obvious as the 1980's near, for, eventually, all of new demand is expected to be due to teacher turnover. To fill the new demand will be new college graduates and experienced returnees. In 1970-71, of 4,566 new teachers employed, 3,310 were estimated to be new college graduates. The remaining 1,240 places were filled by experienced returnees. As Table 14 shows, total new demand, about 8 to 9 percent of total teacher demand annually, is not expected to grow during the 1970's. Rather, it is estimated to be relatively constant during this period.

Table 14. ESTIMATED NEW DEMAND FOR CLASSROOM TEACHERS IN NORTH CAROLINA PUBLIC AND NON-PUBLIC SCHOOLS

Year	Demand Filled by New College Graduates	Demand Filled by Experienced Returnees	Total New Demand	For Enrollment Growth and Pupil-Teacher Ratio Changes	For Teacher Turnover	Total Teacher Demand
	(1)	(2)	(3)	(4)	(5)	(6)
1967-68	4,155	1,385	5,540	1,682	3,858	50,762
1968-69	3,977	1,325	5,302	1,342	3,960	52,184
1969-70	3,657	1,352	5,009	1,024	3,985	53,128
1970-71	3,310	1,256	4,566	641	3,925	53,769
1971-72	3,280	1,240	4,520	660	3,860	54,430
1972-73	2,990	1,110	4,100	220	3,880	54,650
1973-74	3,030	1,070	4,100	100	4,000	54,740
1974-75	3,220	1,080	4,300	160	4,120	54,900
1975-76	3,220	1,080	4,300	130	4,130	55,030
1976-77	3,450	1,150	4,600	450	4,200	55,480
1977-78	3,200	1,100	4,300	120	4,200	55,600
1978-79	3,300	1,100	4,400	200	4,200	55,800
1979-80	3,100	1,100	4,200	-	4,200	55,800
1980-81	3,100	1,100	4,200	-	4,200	56,200
1981-82	3,900	1,300	5,200	900	4,300	57,100

Source: North Carolina Board of Education and A. Padilla.

Note: New demand due to pupil-teacher ratio changes is the enrollment divided by the pupil-teacher ratio of a given year less the same enrollment divided by the pupil-teacher ratio of the previous year. New demand due to enrollment growth is total teacher demand in a given year less total teacher demand in the previous year less the number of teachers needed for pupil-teacher ratio changes. Estimates of teacher turnover based on the USOE study "Teacher Turnover in Public Elementary and Secondary Schools, 1959-69."

NORTH CAROLINA SUPPLY OF TEACHERS:

How large the supply of re-entrants to teaching and of former graduates entering teaching for the first time will be determined by exogenous variables. For example, if the wage of teachers increases relative to the wage of secretarial help, some former teacher education graduates working as secretaries would wish to teach again. This would inflate the supply of teachers wanting to teach. Similarly, a change in a family's income stream may induce former teachers to reenter the teaching profession, thus affecting the supply. As was the case for the national supply, then, quantification of the total stock of teachers in N. C. is difficult. The quantification of the supply of new college graduates prepared to teach is, however, much easier, due to the availability of more information on that component of teacher supply.

New Supply of North Carolina Teachers:

As was true for the national new supply, (see page 16), the supply of new teachers for N. C. schools has three components:

1) former teachers who wish to teach again,

2) teacher education graduates of previous years who wish to teach for the first time, and

3) new graduates of teacher education programs, who qualify for a N. C. Class "A" teaching certificate

For reasons previously mentioned (e.g., more available data), only the supply of new graduates of teacher education graduates will be analyzed. This stock of new graduates will then be compared with the estimated new demand to be filled by new certificated college graduates.

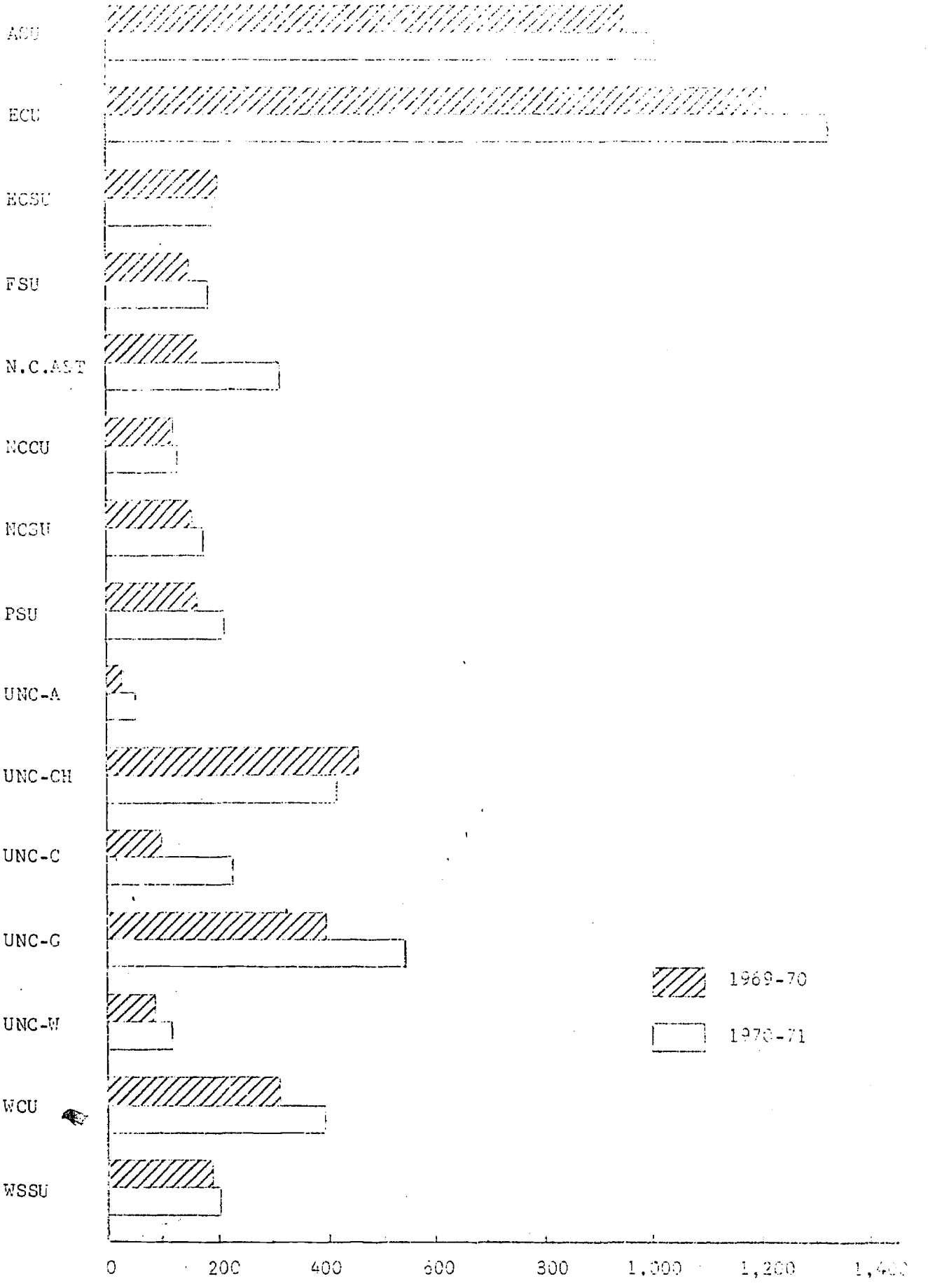
The 1969-1970 and 1970-71 teacher output from the private and public colleges and universities in N. C. is shown in Figures 2 and 3. East Carolina was the largest absolute producer of teachers, with Appalachian State close behind. Atlantic Christian and Campbell College stand out as the largest producers among private institutions.

According to the 1970-71 Statistical Abstract of Higher Education in N. C., (N. C. Board of Higher Education), public institutions awarded 15,087 total degrees in 1969-1970, and of these, 4,695, or over 31 percent, were teacher education degrees. Private institutions awarded 7,999 total degrees in 1969-1970, with 2,073, or 26 percent, being teacher education degrees. Among public institutions (in 1969-1970) awarding teacher education degrees as a large percent of their total degrees were Elizabeth City State (96 percent), Fayetteville State (91 percent), Appalachian State (87 percent), Winston-Salem State (77 percent), and East Carolina (69 percent). Private institutions with similarly high percentages include Sacred Heart College (79 percent), Shaw University (61 percent), and Meredith College (55 percent).

If no major changes take place, the number of new graduates in teacher education is expected to continue to rise during the coming decade. Table 15 shows trends in N. C. teacher education graduates by teaching fields. Perusal of Table 15 reveals an upward trend in the annual number of graduates. Such an upward trend is also evident in most of the individual teaching fields.

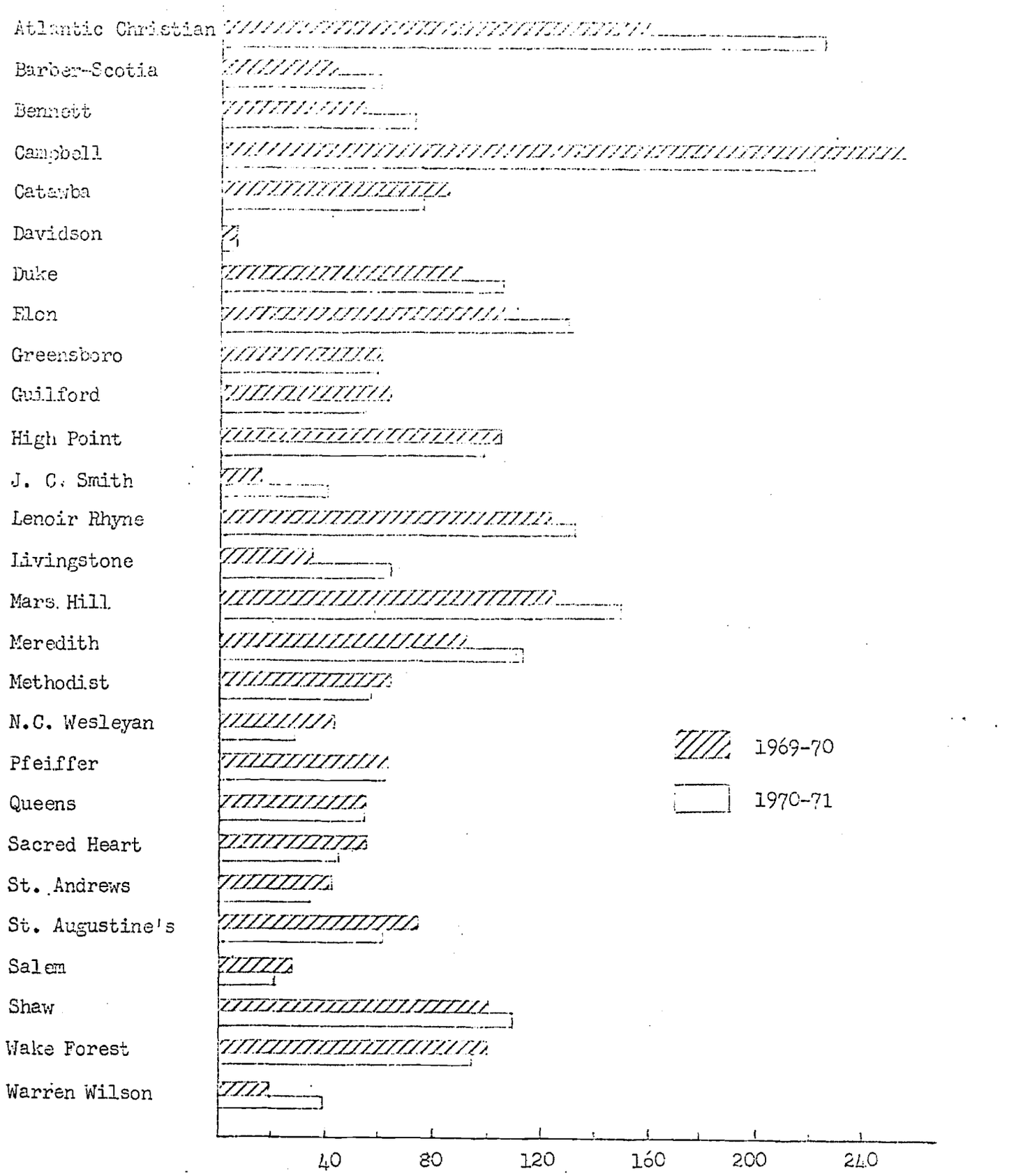
In the past, total teacher education graduates have constituted about 30 percent of the total pool of graduates of N. C. colleges and universities. If no changes occur in such trends, N. C. can expect nearly 9,100 to graduate in teacher education programs in 1975-76 and about 10,000 in 1979-1980 (see Table 16).

Figure 2. [illegible]



Source: Teacher Education and Certification, N. C. Department of Public Instruction

Figure 3. SUPPLY OF TEACHERS FROM NORTH CAROLINA COLLEGES 1969-70 AND 1970-71



Source: Teacher Education and Certification, N. C. Department of Public Instruction

Table 15. TRENDS IN NORTH CAROLINA TEACHER EDUCATION GRADUATES BY TEACHING FIELDS, 1964-71

Type of Preparation	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1971 Estimated
Elementary School Teachers	1645	1992	1838	1648	1845	2099	2222	2488
Secondary School and Special Subject Teachers								
Agriculture	39	44	24	22	27	23	40	45
Art	70	82	74	77	94	119	119	151
Bible	2	3	-	-	-	-	-	-
Business Education	353	385	352	301	320	392	680	749
Distributive Education	Not Reported						4	6
English	501	612	572	579	603	721	744	818
Foreign Language	150	172	190	165	180	243	210	216
Home Economics	158	183	168	167	186	205	216	252
Industrial Arts	60	81	69	80	96	64	123	127
Library Science	28	36	38	51	40	39	49	55
Mathematics	242	295	299	314	285	334	299	357
Music	125	157	108	121	187	177	211	212
Physical Education	388	458	455	405	489	529	672	837
Science	303	299	290	266	230	251	257	296
Social Studies	578	567	550	566	586	760	790	931
Special Education	Not Reported				44	99	112	157
Trade and Industrial	Not Reported					83	16	53
Other	19	81	150	53	18	32	4	1
Secondary School Total	3030	3455	3339	3167	3385	4071	4546	5263
GRAND TOTAL	4675	5447	5177	4815	5230	6170	6768	7751

SOURCE: North Carolina Department of Public Instruction.

Table 16. EARNED DEGREES AWARDED IN NORTH CAROLINA, BACHELOR'S AND MASTER'S, AND GRADUATES PREPARED TO TEACH, 1967/68 - 1979/80.

Year	Total Earned Degrees, Bachelor's & Master's	Total College Graduates Prepared to Teach	(Elementary Teaching)	(Secondary Teaching)
1967-68	17,347	5,230	(1,845)	(3,385)
1968-69	20,762	6,170	(2,099)	(4,071)
1969-70	21,778	6,768	(2,222)	(4,546)
1970-71	23,284	7,751	(2,488)	(5,263)
1971-72	24,200	7,800	(2,400)	(5,100)
1972-73	25,200	7,800	(2,500)	(5,300)
1973-74	26,700	8,300	(2,700)	(5,600)
1974-75	27,700	8,600	(2,700)	(5,900)
1975-76	29,200	9,100	(2,800)	(6,300)
1976-77	30,300	9,400	(2,900)	(6,500)
1977-78	31,600	9,500	(2,900)	(6,600)
1978-79	32,400	9,700	(2,900)	(6,800)
1979-80	33,200	10,000	(3,000)	(7,000)

Source: North Carolina Board of Higher Education; North Carolina Department of Public Instruction; and A. Padilla.

Note: Figures below double lines are projections, based on an extension of current trends.

Again, such a number of annual graduates should be expected if no changes take place in students' preferences. Hopefully, changes will take place, due to the educational system's flexibility, causing some students and resources to shift to academic areas where the demand is greater.

Data on North Carolina college and university graduates, by teaching area, makes possible the computation of supply-demand ratios for North Carolina. As previously explained in this paper (see page 17), the supply-demand ratios serve as an indication of how new supply (adjusted and unadjusted) compares with new demand. If the adjusted ratio is, roughly, equal to one (1) then the supply of new college graduates willing to teach and the demand to be filled by these new graduates is said to be in balance.

Total supply-demand ratios are estimated in Table 17. Scrutiny of the data shows that the adjusted ratio was around one (1) during 1968-69 around the time when surveys taken by the N.E.A. were stating that the general "shortage" of teachers in North Carolina appeared to be over. Projections show an upward trend in this ratio through 1979-80.

Supply-demand ratios are presented in Table 18 for specific teaching areas. Again, the adjusted ratio quantifies and verifies the assertion that some teaching areas are "over-supplied" in North Carolina. For instance, the adjusted ratios for Business Education, Physical Education, and Social Studies (total, including History, Social Studies, etc.) are greater than three (3). This would mean, roughly, that adjusted new supply is about three times as great as the demand in these teaching areas, at the wages paid. Contrariwise, adjusted supply-demand ratios for the Natural and Physical Sciences, Mathematics, Library Science, and general Elementary teaching are near unity (1). The only area found to have an adjusted supply-demand ratio significantly below one (1) was Special Education.

Table 17. TOTAL SUPPLY-DEMAND RATIOS FOR NORTH CAROLINA ELEMENTARY AND SECONDARY SCHOOL TEACHERS, 1967-68/1979-80

Year	Unadjusted Supply-Demand Ratio	Adjusted Supply-Demand Ratio
1967-68	1.26	.88
1968-69	1.55	1.06
1969-70	1.85	1.20
1970-71	2.34	1.59
1971-72	2.40	1.70
1972-73	2.60	1.80
1973-74	2.70	1.90
1974-75	2.70	1.80
1975-76	2.80	2.00
1976-77	2.70	1.90
1977-78	3.00	2.10
1978-79	2.90	2.20
1979-80	3.20	2.30

Source: A. Padilla

Note: New supply was adjusted for those new graduates who do not enter teaching the year after graduation in the "Adjusted" column. The North Carolina Department of Public Instruction gathers data useful in the adjustment process.

Table 18. NORTH CAROLINA SUPPLY-DEMAND RATIOS FOR REPORTED TEACHING AREAS, 1970-71

Area	Unadjusted Supply-Demand Ratio	Adjusted Supply-Demand Ratio
Elementary Teaching	1.40	1.14
Secondary and Special Subjects		
Agriculture	2.86	1.71
Art	3.13	1.79
Business Education	9.19	3.38
English (English, Speech, Journalism)	2.42	1.41
Foreign Languages	2.88	1.89
Home Economics	5.40	3.00
Industrial Arts	2.24	1.37
Librarian	1.40	1.11
Mathematics	1.49	1.05
Music	3.91	2.61
Natural & Physical Sciences (Total)	1.56	.97
Physical Education	5.25	3.49
Social Studies (Total)	5.41	3.27
Special Education	.75	.54

Source: A. Padilla
Note: Useful data in the adjustment of "new" supply is collected by The North Carolina Department of Public Instruction in annual surveys.

SUMMARY, CONCLUSIONS, AND IMPLICATIONS:

This first of a series of manpower studies planned by the North Carolina Board of Higher Education Research Division is intended to serve primarily as a source of information for the citizens of North Carolina. In addition, it is intended to be a source of information from which the N. C. Board of Higher Education might determine policy recommendations on its own, or after consultation with interested individuals and/or groups.

Salient features and implications of this study, as pertain to North Carolina, can be enumerated thusly:

1) More efficient birth control methods, coupled with changing attitudes towards family size, have led to the expectation of further decreased rates of population growth in North Carolina.
2) Elementary and secondary education will not be a "growth" industry in the 1970's. Decreased rates of population growth imply decreasing rates of growth in student population, and, ceteris paribus, in student enrollments at elementary and secondary levels.
3) Elementary and secondary total teacher demand, given expected enrollment trends, is not anticipated to increase during the 1970's as it did during the 1960's. In fact, a decreasing total demand is not incredible.

4) Given current enrollment and graduation trends in North Carolina colleges and universities, the supply of teacher education graduates from colleges and universities is expected to rise annually. Concurrently, as previously indicated, the demand for new college teacher education graduates will more likely be falling.

5) "Surpluses," generally defined by the adjusted supply-demand ratio, exist in most areas of teaching in North Carolina. Moreover, such "surplus" areas are expected to continue to exhibit "excess" supply in the future. The situation would likely be worse if the wage of teachers increases relative to that of other workers, for then the total supply of potential teachers would be augmented by former teachers wanting to teach again.

6) It is the demand side of higher education which changes or fluctuates with rapidity, as witnessed in recent months across the United States. The supply (or the output of higher education) is a fairly rigid concept, relative to the demand for the output. To minimize discrepancies between supply and demand, either the demand needs to be stabilized or the supply made flexible. It is probably next to impossible to stabilize demand, but students (supply) can be made more flexible by giving consideration to the concept of "career alternatives." In structuring certain academic curricula

the "career alternatives" approach, an approach which could prepare students in a manner that he/she would have more than one career possibility, should be given consideration and study.

7) A need exists for on-going manpower studies in teacher education. Information from these should be utilized fully by all universities and colleges, particularly those which traditionally award large numbers of teacher education degrees, in order to evaluate properly the institutional and individual needs.

8) Encouragement should be given to the development of a thorough data base on teachers and teacher education in North Carolina. Such a data base should include more facts on teacher turnover, teacher migration, characteristics of newly-employed teachers, etc. An expanded data base on teacher production is also an essential ingredient to future manpower studies.

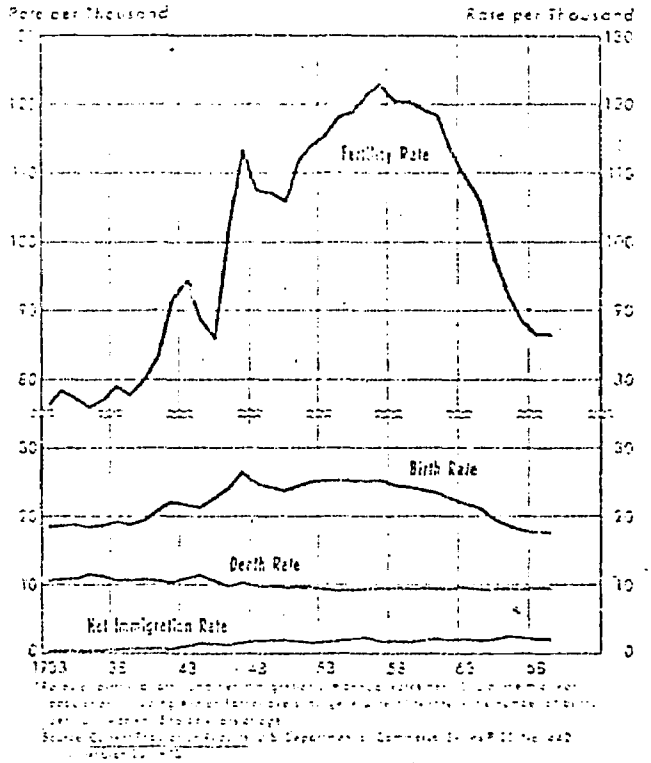
9) The public higher education sector should avoid approval of any new academic programs which would add to the "oversupply" situation. Special emphasis and attention should be given to those fields of study where "shortage" still exist, such as special education, and the causes for "shortages" should be examined.

APPENDIX

POPULATION

Population growth in a country is determined by the birth rate, the death rate, and the net immigration rate. Usually, these rates are expressed in ratio form. For example, birth rate = number of births in a year/midyear population. Multiplying this figure by 1000 gives the number of births/1000 people. The death rate in the U. S. has stabilized at about 9.5 deaths/1000 people annually since World War II, and the net immigration rate has stabilized at about 2/1000 people, making the birth rate the key determinant of population growth. The "crude" birth rate, or the number of births per 1000 people, should be supplemented in population analysis by scrutiny of more sophisticated birth measures, such as the general fertility rate (see the picture). This is an "age-specific" rate (a rate employed for a particular sub-group of the population), and is usually calculated as the ratio of births to all women 15-44 years old divided by the midyear female population in this age group (with the ratio multiplied by 1000). Also, there is the completed fertility rate, which measures the number of children ever born per woman.

The Fertility Rate and Components of Population Growth*



General fertility rates are highest among women 20-29 years of age. An analysis of the number of women in this age group and their corresponding fertility is a key element in the ability to forecast population growth. This fertility is largely

dependent upon attitudes towards marriage, birth control, and family size, and employment. The problems in trying to gauge these changing attitudes are reflected by The U. S. Census Bureau's projection of several, widely differing fertility rates into the 21st century.

North Carolina's birth rate (number of births/1000 population) has decreased since 1960. This has also been the trend for the U. S. as a whole. (Lack of data on female population for North Carolina, by year, makes the estimation of fertility rates difficult.)

The table below summarizes these trends:

	1960	1965	1967	1968	1969	1970
U. S.	23.7	19.4	17.8	17.5	17.7	17.6*
N. C.	24.1	19.9	18.4	18.1	18.1	18.0*

*Estimated.

As can be seen, North Carolina has been following the same general trends as the U. S. as a whole with respect to birth rates.

General fertility rates for North Carolina have been declining, as has the U. S. fertility rate. (Calculations show that North Carolina's general fertility rate is higher than that of the U. S.'s, but not appreciably so. For example, for 1969, the author calculated North Carolina's fertility rate to be 92 births/1000 North Carolina women between ages 15-44. The U. S. rate for 1969, was about 87/1000 women in that age bracket).

Projections by The U. S. Census Bureau are made, as previously mentioned, assuming different future fertility, but identical mortality and immigration rates. The latest total U. S. population projected for year 2000 ranges from 321 million for Series B (a series assumming relatively high fertility) to 266 million for Series E (or the "new" series which assumes a lower fertility). Series A has been dropped

as its fertility assumptions proved too high. Because of the recently-paid attention to the reduction of population growth rates in the U. S., Series X, yet another projection series, was generated by The Census Bureau. Series X assumes that completed cohort fertility (average number of children a cohort of women will bear during their lifetime) will reach replacement levels and will remain there. Replacement level is 2.11 children per woman. At this level, the population will exactly replace itself, thus leading toward a stationary state.

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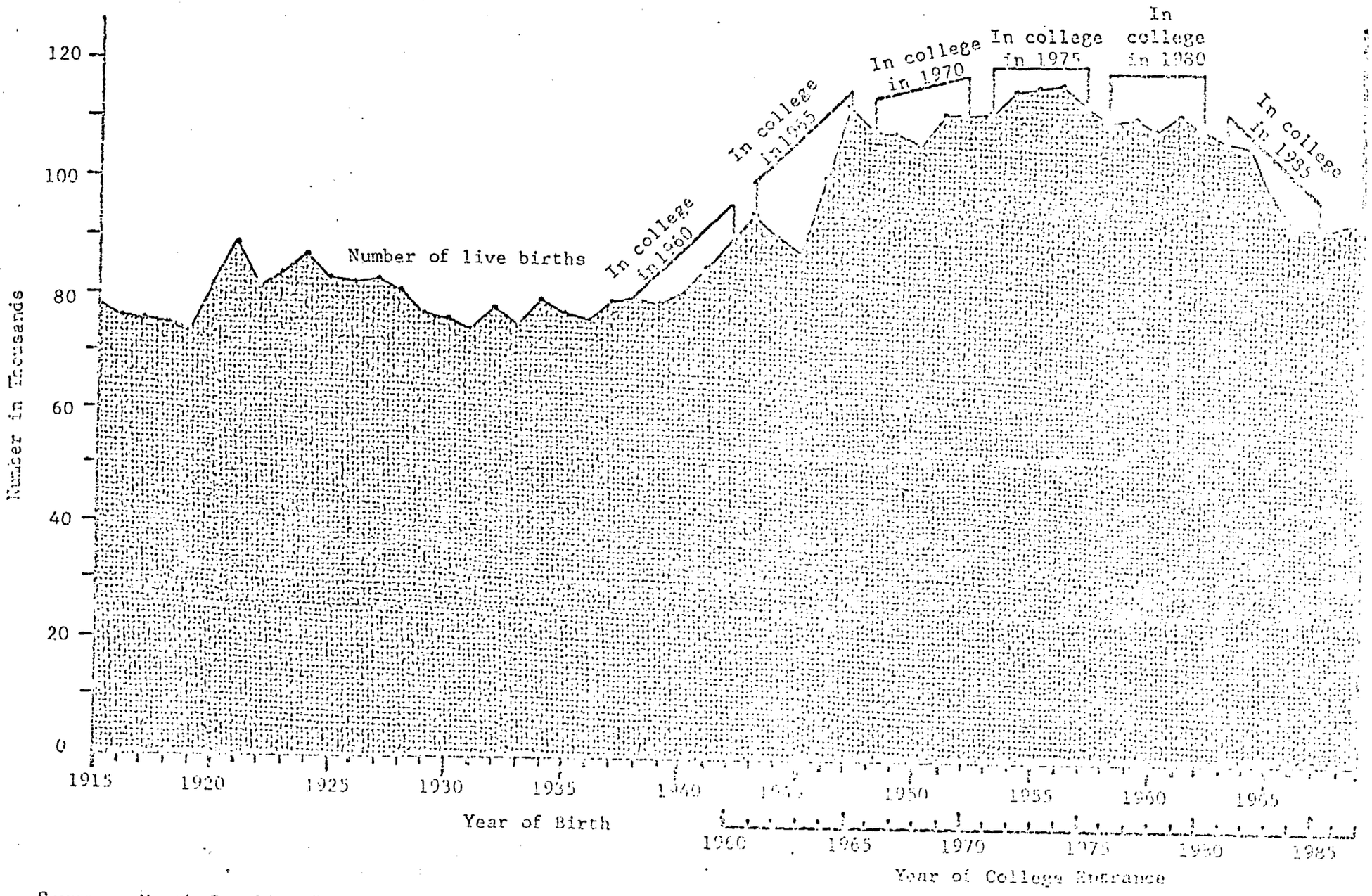
Live Births in North Carolina: 1915 to 1969



Source: North Carolina State Board of Health (underregistration not adjusted)

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