

DEVELOPMENT OF A MATHEMATICAL MODEL FOR  
PROJECTING ENROLLMENT NUMBERS IN A  
NEW MEXICO JUNIOR COLLEGE

By

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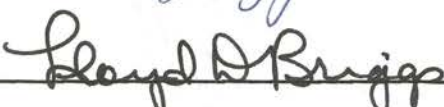
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## CHAPTER I

### INTRODUCTION

Many government funds are now available to finance vocational-technical programs, but the rapid fluctuations in technical trends today make it necessary for institutions of higher education to anticipate programs and enrollment in the vocational-technical disciplines. Since programs depend largely upon enrollment, projection of prospective student enrollment numbers is of importance to school administrators.

Demands by the oil and potash industry for skilled technical workers and technicians educational programs in Lea County, New Mexico and surrounding areas have made acquisition and organization of data pertaining to projected enrollment of utmost value to New Mexico Junior College.

The discovery of oil in Lea County in 1928 brought an immediate and rapid rise in population. What had been a large area of ranch land and very few people was, by 1955, a thriving industrial area of some 40,000 people. By 1962 the total annual income for the county was \$16,800,000. Of this, more than two-thirds was derived from the oil industry.<sup>1</sup> When, in 1959, potash mining was inaugurated in the county, demand for manpower in industry increased. At that time concerned individuals in the country began to realize the need for an institution of higher education not only for the purpose of college



transfer courses, but to train the youth in the vocational-technical field.

In 1965 voters of four Lea County public school districts approved the development of a two-year institution of higher education. Because of the need for vocational-technical training, the first phase of the building program was to include two vocational-technical buildings.<sup>2</sup> Today New Mexico Junior College serves approximately 1000 students. Of these almost one-third are enrolled in courses in the Vocational-Technical Department.

#### The Problem

The problem with which this study was concerned was the lack of data available to the educational institutions in the state relative to projecting enrollment numbers.

#### Purpose of the Study

The purpose of this study was to develop a mathematical model for projecting enrollment numbers at New Mexico Junior College.

#### Need for the Study

The demands of industry in Lea County have changed drastically in the last two decades. The 1964 edition of New Mexico Studies in Business and Economics defined the mining industry of Lea County as "reduced employment and enlarged payroll" which would indicate the trend toward utilizing skilled and experienced workers.<sup>3</sup> The population of the county is expected to increase over 1960 figures of 53,429 by some 31,000 in 1980. This projection is made on the basis

of existing manufacturing of which oil and potash stand in the forefront.<sup>4</sup>

With the excess of college graduates in the United States the enrollment trend has now centered on the vocational-technical aspects of higher education. In an endeavor to offer areas of study which will best serve the needs of the student and the community, New Mexico Junior College has provided an annual budget of \$400,000 for the vocational-technical programs.<sup>5</sup> Yet, to best serve these needs, accurate projections of enrollment based on population and industry must first be made.

New Mexico Junior College is developing a data bank of information in cooperation with the Western Interstate Commission on Higher Education (WICHE) for the use in developing a computer model for budget planning and justification of educational budgets to governing boards.

The college has questions with regard to course offerings, course content, and job placement of its graduates which enter into factors influencing enrollment predictions. It is essential that information on potential enrollment be available to the administration for decision-making in regard to budgets, laboratory facility scheduling, course offering and faculty.

#### Scope of Study

This study was limited to enrollments in five vocational-technical disciplines being offered at New Mexico Junior College. These study areas include Drafting, Electronics, Automotive, Machine Tool, and Welding. An analysis was made of the enrollment of these disciplines

between 1966 and 1971. A follow-up study was made only on those students who indicated an intent to enroll in the vocational-technical area during the past five academic years. Approaches to determine enrollment predictions included projected enrollment derived from actual past history enrollment data of the Junior College, senior information surveys of area high schools and cohort-survival data.

Data was analyzed from the four public school districts comprising the junior college district. These public school districts included Hobbs, Eunice, Tatum, and Lovington. Other data analyzed were actual and projected statistics on birthrate, population, economics and industrial make-up of the county through 1975.

#### Assumptions

Design of this study was based on the assumption that there are constant, definable factors which determine enrollments. It was also assumed that these factors are related to elements such as population change, employment rate fluctuations, technical needs of industry and economic climate.

Information regarding courses of study at New Mexico Junior College can assist the student in identifying those areas in which he should be able to succeed. This study, therefore, is supported by the assumption that projections of enrollment numbers in the vocational-technical areas of New Mexico Junior College can serve the college and its students in successful curriculum planning.

### Definition of Terms

Vocational-Technical at New Mexico Junior College refers to that branch of education which is designed to prepare persons to perform limited technical tasks that are primarily parts of industrial activities.

Lea County is located in the southeast corner of New Mexico. Its southern and eastern boundaries are formed by the state boundaries of Texas. The primary industries are oil and potash mining.

New Mexico Junior College (sometimes referred to as the Junior College) is the proper name of a state-supported institution of higher education. Accredited by the North Central Association, it offers a curriculum of college transfer, vocational-technical, and continuing education courses. Degrees offered by the Junior College include Associate of Arts, Associate of Science and Associate of Applied Science. Financial support is provided through local millage, state aid, federal funds, tuition and fees, and the newly formed New Mexico Junior College Foundation. The Junior College operates on a 263 acre tract in the center of Lea County, four miles north of Hobbs.

Junior College District includes all of Lea County with the exception of the Jal Public School District which comprises the southern part of the county.

In-District Graduate has fulfilled requirements for a high school diploma within the district.

Public School District unless otherwise stated, refers to the four public school districts comprising the New Mexico Junior College District.

FFE refers to First-time Freshman Enrollment.

BEF refers to the State Board of Educational Finance.

Five Disciplines are, in this study, the study areas of the Vocational-Technical Department of New Mexico Junior College which offer courses in Drafting, Electronics, Automotive, Machine Tool, and Welding.

Cohort-Survival, is, in this study, a method of using past enrollment numbers in determining fluctuations of student numbers according to ratio survival.

FOOTNOTES

<sup>1</sup>Ralph L. Edgel and Peter J. LaLonde, "Income and Employment in New Mexico, 1960-64. New Mexico Studies in Business and Economics (Albuquerque, 1964), 15, p. 27.

<sup>2</sup>John Shepherd, Vice President for Instruction, New Mexico Junior College. Personal Interview. New Mexico Junior College, April, 1972.

<sup>3</sup>Edgel, Studies, p. 27.

<sup>4</sup>Ralph L. Edgel, Projections of the Population of New Mexico and Its Counties to the Year 2000 (Albuquerque, 1965), p. 17.

<sup>5</sup>Shepherd, Interview.

## CHAPTER II

### REVIEW OF LITERATURE

The success of New Mexico Junior College and of the entire junior college movement in general depends on how each institution meets the needs and demands of the social system it serves. Each facet of the institutional program should reflect the objectives of the college. The objectives of New Mexico Junior College Vocational-Technical Department are to provide beneficial courses not only to the student wishing to gain competence in an employable skill, but to the employed worker wishing to improve his skill as well. This study is not concerned with course content, but with effective projection of enrollment numbers for course offerings.

Grant Venn said:

The new technology has removed the margin of educational error. Historically, the number and kind of jobs available to the undereducated permitted schools and colleges a "margin of error" in planning educational programs and providing educational opportunities. Today, however, the inability of a technological society to make full use of uneducated individuals narrows the margin to the point where the repercussions of each educational failure can be felt throughout the entire society.<sup>1</sup>

This, of course, is the purpose of a projection model; to reduce the "margin of error" so that the objectives of a college can better meet the objectives of the society it serves.

## Projection Studies

Any judicious planning regarding a school district dictates the necessity of predicting the number of students at any given date.

A. J. Jaffe emphasizes this need in his Handbook of Statistical Procedures:

In order to plan realistically for coming events in any part of the United States, it then becomes necessary to estimate the number of pupils which there is likely to be. The future pupils, so to speak, are the beginning of the process; their number determines the teaching and other facilities which will be needed. Therefore, a crucial question becomes: How many pupils will there be in any given area at some specified future date?

The facilities which will be needed cannot be created overnight. There is a lag of several years between the time at which more teachers, buildings and other facilities will be needed, and the time they can be available. The essence of planning them is to anticipate these future needs sufficiently in advance so that the teachers and facilities will be there when the pupils arrive.<sup>2</sup>

John L. Wasik, in The Development of a Mathematical Model to Project Enrollment in a Community College System, said:

One major consideration related to the development of any model is whether or not it can be utilized by relatively untrained personnel. The major outcome of this project from which this paper developed is to be a set of procedures that can be used by personnel with the responsibility for developing budgeting and/or policy decisions at either the local, regional (i.e., county or groups of counties) and state levels. It is expected that data will need to be collected periodically to update the models in order to take into account the social and/or economic environmental changes resulting in college attendance and curriculum tendencies.<sup>3</sup>

Another major consideration in searching for a projection technique is to find the most effective one for the area in question and for the type of projection to be made. The Handbook of Statistical Figures has this to say:



Perhaps one of the most frequently used techniques in the projection of school enrollment is the cohort-survival or grade persistence method. The technique derives its name from the use of grade-to-grade survival or persistence ratios . . . .<sup>4</sup>

The Southern Regional Educational Board used the cohort-survival method to project public school enrollment and reports:

We also plan to use a modification of the cohort method to revise our college enrollment projections, which were made by the ratio method. The tests which we made in planning this study showed that a two-year forecast by the cohort method had a per cent of error only about half as large as the ratio method when compared with actual enrollment for the two years.<sup>5</sup>

#### Population Statistics and Economic Conditions

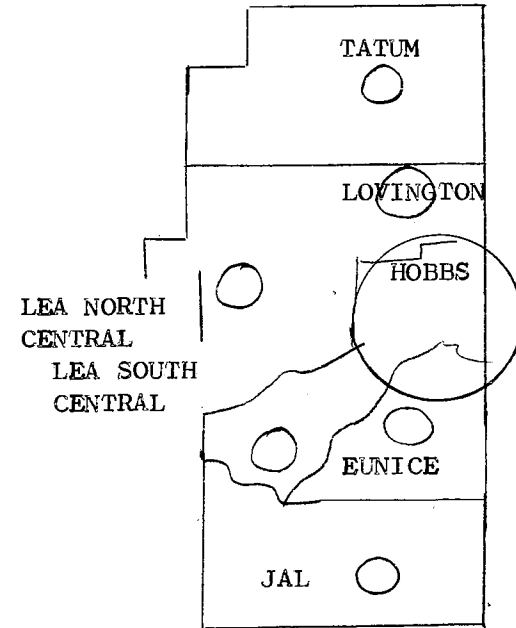
In any enrollment projection study population should be of primary concern. Yet in reviewing studies of population projections of Lea County for the year 1970 a divergent range of almost 16,000 inhabitants was observed between studies. The Bureau of Business Research estimated 1970 population for Lea County at 49,600.<sup>6</sup> Actual Census Bureau figures gave credit to this projection with a population total of 49,554 for 1970, some 12,000 under that of projections in a study by Ralph L. Edgel.<sup>7</sup> Though Edgel predicted a rise, the actual population of Lea County for 1970 was a drop of 3,875 under the 53,429 population of Lea County for 1960.<sup>8</sup> See Table I.

Edgel, himself said:

. . . we assumed that the biggest share of such employment [in relation to population] would go to the more populous areas and to those which have become established as service centers, such as Bernalillo, Doña Anna, Lea . . . .<sup>9</sup>

TABLE I  
POPULATION TREND FOR LEA COUNTY

	<u>1960</u>	<u>1970</u>	<u>DIFFERENCE</u>	<u>PER CENT CHANGE</u>
EUNICE	4,794	3,282	-1,512	-31.5
HOBBS	26,275	27,626	+1,351	+5.10
JAL	4,133	3,241	- 892	-21.6
LEA NORTH CENTRAL	3,020	2,258	- 762	-25.2
LEA SOUTH CENTRAL	3,193	2,232	- 961	-30.1
LOVINGTON	9,660	8,915	- 745	-7.70
TATUM	<u>2,354</u>	<u>2,000</u>	<u>- 354</u>	<u>-15.0</u>
TOTAL	53,429	49,554	3,875	- 7.30



Source: FHA Water and Sewer; Area Plans, Lea County, New Mexico.  
State Planning Office (Santa Fe, 1970).

New Mexico Progress for April and June, 1971, showed a state-wide decline of 600 wage and salary employees of the oil and gas industry from January, 1970 to January, 1971. At the same time wage and salary employment in the non-metallic minerals and coal industry increased by 200 persons in New Mexico for the same period.<sup>10</sup> Here, then, is a variable not to be overlooked; a reduced work force. Yet even with this smaller work force oil and gas production in New Mexico rose by some \$15,000,000 in 1970 while an even busier potash industry's production rose by \$22,000,000.<sup>11</sup>

During a ten-year period (1959-1969) the population of Lea County dropped from 51,600 to 49,800, while the total personal income rose from \$115,024,000 to \$171,884,000 as shown in Table II.<sup>12</sup> As one Resource Economist puts it:

In the past mineral materials were accepted on the market in raw form with very little processing. Today and in the future the market will increasingly demand products that are processed and synthesized to chemical specifications and purity. Much more "knowledge" and capital goods will be employed per unit of product. Poorly trained personnel will be synonymous with poor competitive capabilities of industrial unit.<sup>13</sup>

TABLE II

## POPULATION-TOTAL PERSONAL INCOME FOR LEA COUNTY

	<u>1959</u>	<u>1962</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>
Population	51,600	53,000	49,700	49,500	47,000	48,800	49,800
Average Per Capita Income	\$2,229	\$2,396	\$2,853	\$2,943	\$3,236	\$3,311	\$3,452

Intimate knowledge of the local conditions is a necessity in projection technique for here lies the basis for offering the student beneficial courses. Aikin Conner pointed this out in his paper on enrollment projections:

The total enrollment of a college at any time then represents a measure of positive response to the educational needs or demands of its community. Predicting enrollment, from this point of view, depends upon accurately estimating the force of educational demands in the community served, and assessing the effects of institutional responses to those demands. The first requires foresight, the second understanding.<sup>14</sup>

#### Educational Statistics

Awareness of the need for vocational-technical training has come to the forefront in the past decade. Each year high school graduates who are non-college bound fail to take advantage of the post-secondary training offered.

Much of the same is true of the high school graduates who do not go on to college. This group, more than a million strong, represents a high-potential force for post-high-school occupational education. As it stands now, they are having many of the same difficulties in school before graduation. Fully 15 per cent of these graduates are now unemployed, and undoubtedly a high percentage of those who do have jobs are underemployed. Fifty to 60 per cent of the people in this group must eventually find employment as middle-level manpower in the technical, semi-professional, and skilled occupations for which a one- or two-year college level program of semi-professional, technical, or vocational education would provide the ideal preparation.<sup>15</sup>

In 1970 and 1971, a follow-up study was made of the graduates of Tatum High School classes of 1961 and 1962. Of thirty graduates answering, twenty-two answered the question "Do you feel that Tatum High School should be offering more vocational courses?" in the affirmative.<sup>16</sup> This is indicative of the total vocational-educational

atmosphere. The national picture for vocational-technical education looks bright according to statistics. Fall Enrollment for Higher Education 1970 said:

Among publicly controlled institutions, universities showed a drop in vocational enrollment, but other four-year and two-year colleges showed gains--the latter by 34.1 per cent.<sup>17</sup>

The total enrollment in both four-year and two-year institutions of higher education was an estimated 3.6 million in 1959. This total is expected to rise to 12.2 million in 1979 with ten per cent accredited to occupational or general non-degree studies.<sup>18</sup>

In New Mexico the 8,211 high school graduate total in 1960 rose to 16,428 in 1971. At the same time the percentage of those planning to enter college has fluctuated from 45.78 per cent to 49.81 per cent.<sup>19</sup> In the New Mexico Junior College District approximately 3.33 per cent of the 780 high school graduates for 1971 expressed the desire to enter the Vocational-Technical Department of the Junior College. This, however, shows a decline over the 1967 figures when 5.13 per cent of 643 graduates expressed the desire to enter the same area of study at the Junior College.<sup>20</sup>

In checking local statistics two things are evident:

1. There is a definite decline in number as a group progresses grade by grade.
2. There has been a definite decline in enrollment in the lower grades within the past eight years. This decline is consistent with national figures.

In 1967 there were thirty-three in-district male FFE enrolled in the New Mexico Junior College Vocational-Technical Department. By 1970 this number had risen to fifty-two, a rise of 63.5 per cent.<sup>21</sup>

The Junior College must answer the need for classes, by way of budget, facility, and faculty. The following is a study of a mathematical model of projection to aid the college in their planning program.

#### FOOTNOTES

- <sup>1</sup> Grant Venn, Man, Education, and Work (Washington, 1968), p. 158.
- <sup>2</sup> A. J. Jaffe, Handbook of Statistical Procedures for Long-Range Projections of Public School Enrollment (Washington, 1969), p. 1.
- <sup>3</sup> John L. Wasik, The Development of a Mathematical Model to Project Enrollment in a Community College System (Raleigh, 1970), p. 5.
- <sup>4</sup> Jaffe, Handbook, p. 9.
- <sup>5</sup> John K. Folger, "The Cohort-Survival Method," quoted in Jaffe, Handbook, p. 18.
- <sup>6</sup> Desmond A. White and Shirley J. Huzarski, "Estimates of the 1970, 1971 and 1972 Population of New Mexico Counties," Business Information Series (Albuquerque, 1965), 49, p. 28.
- <sup>7</sup> Ralph L. Edgel, "Projections of the Population of New Mexico and Its Counties to the Year 2000," Business Information Series (Albuquerque, 1965).
- <sup>8</sup> United States Department of Commerce, Bureau of Census, Number of Inhabitants in New Mexico (Washington, 1971), p. 13.
- <sup>9</sup> Edgel, Projections, p. 17.
- <sup>10</sup> New Mexico Progress, XXXVIII (Albuquerque, 1970), p. 17.
- <sup>11</sup> *Ibid.*, pp. 24-25.
- <sup>12</sup> William R. Watson and Shirley J. Huzarski, "Income and Employment in New Mexico, Selected Years 1929-1969," Business Information Series (Albuquerque, 1973), 22, p. 34.
- <sup>13</sup> William E. Bertholf, III, "The Mineral Element," Summary Reports on New Mexico's Resources (Santa Fe, 1966), p. 45.
- <sup>14</sup> Aikin Connor, Community College Enrollment Projections (Washington, 1969), p. 5.
- <sup>15</sup> Venn, p. 24.
- <sup>16</sup> Dwayne E. Wood, "Eleven Year Follow-Up Study: Classes of 1960's and Class of 1970" (Tatum, New Mexico, 1971).

<sup>17</sup>George W. Wade, Fall Enrollment for Higher Education, 1970: Supplementary Information Summary Data (Washington, 1971), p. 7.

<sup>18</sup>Kenneth A. Simon and Marie G. Fullman, Projections of Educational Statistics to 1979-80 (Washington, 1970), p. 15.

<sup>19</sup>Leonard J. DeLargo and Henry F. Borgrink, State of New Mexico Annual Statistical Report of the Superintendent of Public Instruction: 1970-1971 (Santa Fe, 1971), p. 144.

<sup>20</sup>Paul Richards, Principal, Tatum High School; Mr. O. G. Blackard, Assistant Principal, Lovington High School; Bill Blankenship, Counselor, Hobbs High School, Gwen Hahn, Registrar, Eunice High School, Personal Interviews, Hobbs, New Mexico, June, 1972.

<sup>21</sup>Office of the Registrar, "BEF Reports, 1966-1972," New Mexico Junior College (Hobbs, New Mexico, 1972).



## CHAPTER III

### METHODOLOGY

This study was concerned with the development of a mathematical model to project in-district enrollment numbers at New Mexico Junior College. Data was collected from the four public school districts which the junior college district comprises, from the State of New Mexico Annual Statistical Report of the Superintendent of Public Instruction: 1970-1971, and from the Office of the Registrar, New Mexico Junior College. Other data were collected on economic status of the county, population numbers of the county, number of residences in the county, county employment rate, and county birthrate, but these were not used directly in the development of the projection model.

#### Public School Data

Primary cohort-survival data for the four public school districts were collected from the Annual Statistical Report.<sup>1</sup> Enrollment data in all grades of the four public school districts from the Fall, 1960 through the Spring, 1971 were taken from this report.

In the follow-up investigation, cohort-survival charts were sent to each of the four public school districts. These charts, illustrated in Appendix A, were filled by administrative officers of the school systems with the enrollment numbers of each grade for each year from 1960-61 through 1970-71. The charts also included number of graduates

for these years.

In order to update material the author held telephone interviews with Kay Thomas of the Office of the Superintendent of Public Instruction in Santa Fe<sup>2</sup> and with administrative officers of the four public school districts.<sup>3</sup> This cumulative data were charted as shown in Tables III, IV, V, and VI.

#### Junior College Data

In assembling the data in regard to enrollment numbers at the New Mexico Junior College the author began with the BEF reports in the Office of the Registrar. These reports, an example of which is found in Appendix A, are made out on the tenth day after enrollment. From these reports the number of total male enrollees was taken.

Place of residence of these enrollees was taken from actual class roles and tabulated according to locality and semester hours. Residences were listed in eight areas, as shown in Appendix A: Hobbs, Lovington, Eunice, Tatum, Jal, Other New Mexico, Texas, and Other. From these the number of in-district male enrollees was taken.

FFE status was figured by checking the actual enrollment slips of these in-district male enrollees. This was done by comparing the date of high school graduation against the date of enrollment at New Mexico Junior College. For instance, if a student had graduated from an in-district high school in May, 1968 and had enrolled at the Junior College in Summer or Fall, 1968, he was considered a FFE for 1968. The percentage of those who enrolled for Fall, 1968 after attendance at another post-secondary institution was negligible and therefore was not considered.

TABLE III

## TATUM PUBLIC SCHOOL DISTRICT ENROLLMENT 1960-1970

GRADE	1960 1961	1961 1962	1962 1963	1963 1964	1964 1965	1965 1966	1966 1967	1967 1968	1968 1969	1969 1970	1970 1971	TOTAL
1	61	73	77	65	53	40	49	51	71	52	55	647
2	66	57	61	39	46	45	34	49	41	53	43	534
3	74	58	63	47	37	38	39	36	49	45	39	525
4	51	62	49	49	45	32	36	46	39	44	41	500
5	65	49	69	39	47	38	38	40	42	43	39	509
6	57	60	53	57	43	39	36	45	41	40	37	508
7	53	57	45	42	60	41	40	43	50	42	38	517
8	36	52	50	41	38	47	42	32	42	47	35	468
9	33	37	49	47	38	34	41	45	44	33	41	442
10	29	24	37	43	41	35	30	44	48	40	29	406
11	33	29	26	40	31	37	32	22	48	32	37	373
12	26	25	26	25	32	26	34	22	23	39	30	316
TOTAL	584	583	605	540	511	458	451	489	538	516	464	5,739

TABLE IV

## LOVINGTON PUBLIC SCHOOL DISTRICT ENROLLMENT 1960-1970

GRADE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	TOTAL
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	
1	643	517	511	459	410	405	314	324	323	329	318	4,553
2	434	487	483	366	394	362	331	293	301	291	275	4,017
3	444	417	452	346	328	333	292	285	276	287	262	3,722
4	408	398	425	371	325	314	304	288	263	276	254	3,626
5	334	394	414	347	374	373	282	279	304	273	270	3,634
6	384	342	388	331	335	345	296	281	280	293	263	3,518
7	229	436	241	247	383	304	324	355	371	337	378	3,305
8	215	230	199	249	270	228	295	310	336	300	268	2,900
9	225	210	214	236	255	264	267	273	307	267	261	2,779
10	179	171	187	216	221	219	243	256	289	240	246	2,467
11	161	147	160	180	187	180	208	203	247	216	230	2,139
12	125	126	114	137	149	156	174	174	239	195	198	1,787
TOTAL	3,801	3,675	3,788	3,485	3,631	3,433	3,330	3,321	3,536	3,304	3,143	38,447

TABLE V

## HOBBS PUBLIC SCHOOL DISTRICT ENROLLMENT 1960-1970

GRADE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	TOTAL
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	
1	920	914	921	891	896	857	851	812	781	744	711	9,298
2	807	820	836	783	791	762	751	734	712	683	649	8,328
3	790	752	830	792	747	736	698	729	702	685	661	8,122
4	714	754	745	822	803	735	697	692	718	662	660	8,002
5	628	685	799	706	796	794	695	699	680	690	640	7,812
6	612	610	671	759	709	769	758	692	700	648	709	7,637
7	655	638	620	693	752	740	762	794	686	703	652	7,695
8	626	638	602	612	667	725	696	728	747	656	662	7,359
9	532	635	598	627	608	647	697	703	689	726	675	7,137
10	436	495	567	687	617	662	633	378	695	651	724	6,845
11	367	384	393	612	573	521	548	544	604	609	584	5,739
12	327	309	300	373	491	496	484	441	452	523	526	4,722
TOTAL	7,414	7,634	7,882	8,357	8,450	8,444	8,270	8,246	8,166	7,980	7,853	88,696

TABLE VI

## EUNICE PUBLIC SCHOOL DISTRICT ENROLLMENT 1960-1970

GRADE	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	TOTAL
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	
1	202	167	151	119	131	119	95	87	76	68	66	1,281
2	141	160	139	116	100	97	100	73	75	69	71	1,141
3	143	125	143	107	103	93	88	90	72	72	66	1,102
4	126	136	135	133	98	92	93	90	82	73	75	1,133
5	125	117	116	115	132	98	78	83	90	81	69	1,104
6	109	118	111	105	112	131	90	77	75	89	78	1,095
7	99	83	106	96	100	97	125	80	78	73	85	1,022
8	111	96	72	101	91	98	93	119	87	71	70	1,007
9	71	101	87	74	96	78	101	95	116	55	66	970
10	72	63	103	76	63	98	78	82	84	107	80	902
11	66	54	50	89	65	64	76	70	76	71	91	772
12	62	58	48	45	83	59	58	67	60	69	72	682
TOTAL	1,327	1,278	1,261	1,177	1,174	1,124	1,071	1,013	971	928	889	12,213

Actual class rolls were checked to determine the number of FFE enrolling in the Vocational-Technical Department. A student was counted one time regardless of the number of courses in the Vocational-Technical Department he was enrolled in during a semester. In-district male FFE numbers were taken from the Fall, 1967 through the Spring, 1972. Results of this cumulative data were charted as shown in Table VII.

TABLE VII

IN-DISTRICT GRADUATES - FFE NMJC  
FFE MALE VO-TECH 1967-1971

Year	In-District Graduates	Number of In-District FFE in NMJC	Number of In-District FFE in NMJC Vo-Tech Programs
1967	643	270	33
1968	681	271	28
1969	764	300	39
1970	786	281	52
1971	780	294	26

### Procedure

The first steps of the projection technique charts, shown in Appendix B, were made up of past history cohort data of the ninth, tenth, eleventh, and graduate grade levels of each public school district. These enrollment numbers were charted for the past ten years in order to project a three-year prediction.

To compute survival ratios for each grade a diagonal line following the progression of the first year's ninth grade is drawn. In the same manner a line is drawn showing the progression from the ninth grade of the final year's graduates as shown in Table VIII.

The ninth grade enrollment total for the years 1961-1968 is then divided by the graduate total for the years 1964-1971. The resulting survival ratio is applied to the number of ninth grade enrollees for 1972 and a projected number of graduates for 1975 is the result.

To compute 1974 graduates, as in Table VIII, the diagonal lines follow the first tenth grade's progression through graduates and the progression of graduates in 1971 from the tenth grade. Totals from the first tenth grade up to, but not including, the tenth grade for 1970 are divided by graduate totals from 1971 back through 1963. This ratio is then computed with the tenth grade total for 1972 resulting in a projection of 1974 graduates. It is then possible to compute 1973 graduates from the eleventh grade totals.



TABLE VIII

ENROLLMENT PROJECTIONS THROUGH 1975 - TATUM PUBLIC SCHOOL DISTRICT

GRADE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Ninth	33	37	49	47	38	34	41	45	44	33	41	36				.7255	6.6828**
Tenth	29	24	37	43	41	35	30	44	48	40	29	36				.7898	6.5227**
Eleventh	33	20	26	40	31	37	32	22	48	38	37	32				.8499	2.8327
Graduates	26	24	26	24	31	26	34	29	23	39	20	32	27*	28*	26*		

\* Projected Graduates

\*\* Significant at the 0.05 level

Ratios were checked for goodness of fit by the chi-square or null-hypothesis criterion using the formula:

$$\chi^2 = \frac{(f-e)^2}{e}$$

Chi-square significance was rated at the 0.05 level according to the  $\chi^2$  Distribution chart in Appendix B. If the null-hypothesis is accurate, the ratio of  $\chi^2$  statistic is approximately the chi-square distribution as in Figure 1.<sup>4</sup>

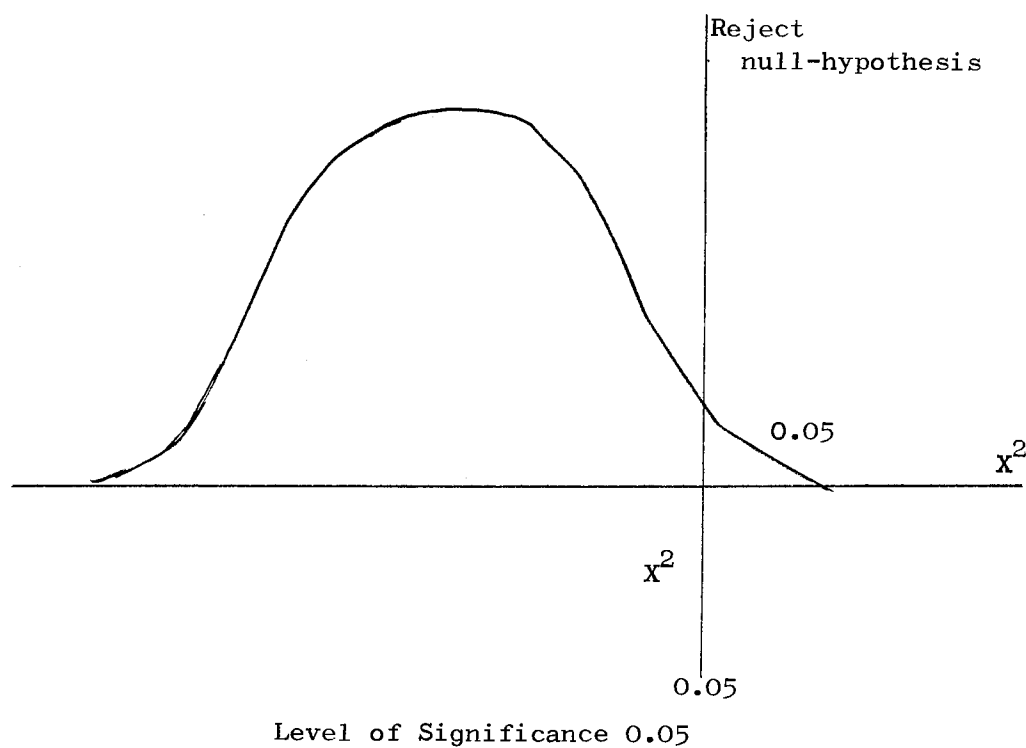


Figure 1. Chi-Square Distribution<sup>5</sup>

A second step is projected with past history data from the New Mexico Junior College and public school graduates. An average survival ratio is found by dividing total in-district male FFE at the Junior College by total high school graduates from the four public school districts for the past ten years. When an average survival ratio is found it is then applied to projected graduate numbers and projected number of in-district male FFE is the result. A third step, using the same procedure, is then applied to total in-district male FFE and in-district FFE enrolling in the Vocational-Technical Department for further projections.

Since outside forces such as economics, population changes, industrial make-up, and birthrate are not brought directly to bear on this method of projection it is suggested by the author that it be used only for short-range projections. It is also suggested that the instruments can present an accurate projection only when the applicants are aware of the outside forces of the community.

#### FOOTNOTES

<sup>1</sup> Leonard J. DeLargo and Henry F. Borgrink, State of New Mexico Annual Statistical Report of the Superintendent of Public Instruction: 1970-1971 (Santa Fe, 1971), p. 141.

<sup>2</sup> Kay Thomas, Office of the Superintendent of Public Instruction, Personal Interview, Hobbs, New Mexico, June, 1972.

<sup>3</sup> Paul Richards, Principal, Tatum High School; O. G. Blackard, Assistant Principal, Lovington High School; Bill Blankenship, Counselor, Hobbs High School; Mrs. Gwen Hahn, Registrar, Eunice High School, Personal Interviews, Hobbs, New Mexico, June, 1972.

<sup>4</sup> John E. Freund, Statistics, A First Course (Englewood Cliffs, New Jersey, 1970), p. 247.

<sup>5</sup> Ibid., p. 248.

<sup>6</sup> Ibid., p. 236.

## CHAPTER IV

### ANALYSIS OF DATA

Data for this study was collected from two major sources: actual enrollment figures from the four public school districts and from the New Mexico Junior College. Data was collected for each grade level of each public school district and for each discipline of the Junior College with which this study was concerned. The remainder of this chapter is devoted to a description of the public school data, the New Mexico Junior College data, and the data derived from use of the projection method.

#### Public School Statistics

The sources of information for the public school districts used in this study were administrative officials of the four public school districts<sup>1</sup> and the State of New Mexico Annual Statistical Report of the Superintendent of Public Instruction: 1970-1971.<sup>2</sup>

#### Tatum School District

Tatum school data from the years 1960-61 through 1970-71 was discussed in a personal interview with Paul Richards, Principal, Tatum High School.<sup>3</sup> The records include enrollment of grades one through twelve, number of graduates for each year, number of graduate boys and graduate girls, and an estimated percentage of those graduates who

attend college.

The records show a reduction of better than 100 total enrollees in the system in the year 1970-71 below the year 1960-61 (Figure 2). It is significant that this reduction does not at this time affect grades eight through twelve but is found mainly in the lower grades.

In the three school years, 1967-1970, enrollment rose and again subsided. According to Mr. Richards, this was due to a population influx caused by increased oil field production in Northern Lea County.<sup>4</sup>

Percentages of Tatum graduates enrolling in college fluctuated only by fifteen per cent within the years 1967-1971. These figures were estimated from the amount of transcripts sent from the Tatum High School to institutions of higher education.<sup>5</sup>

#### Lovington School District

Data discussed with O. G. Blackard of the Lovington High School showed the same fluctuating decrease from year to year in total enrollment and the same gradual decrease in enrollment from grade to grade as did the data from the Tatum schools.<sup>6</sup>

Although total enrollment figures in Figure 3 decreased by approximately 17 per cent during the years 1960-71, graduate totals for these years rose by 55 per cent with a peak rise in 1969 of 82 per cent over the number in 1960.

From transcript requests it was estimated that the number of graduates entering college fluctuated by eight per cent in a downward trend from 1967-1970.<sup>7</sup>

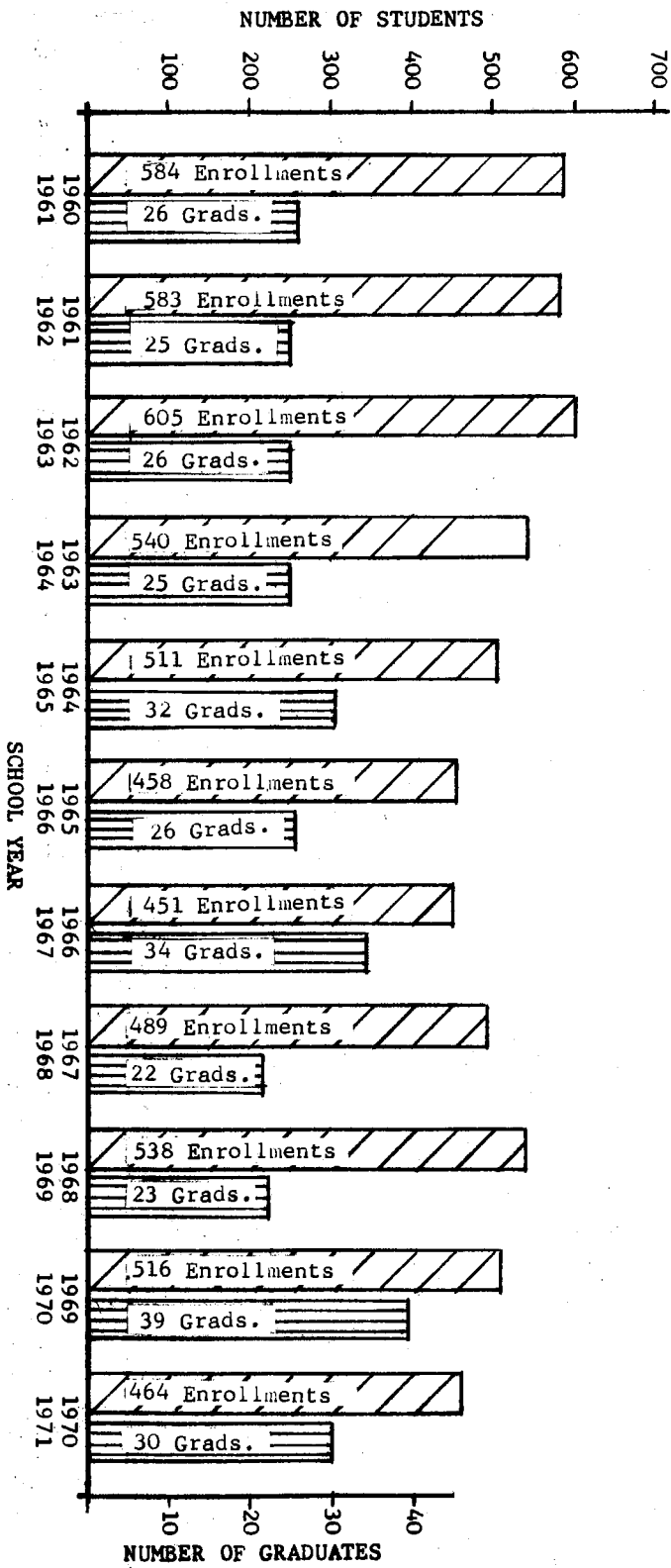
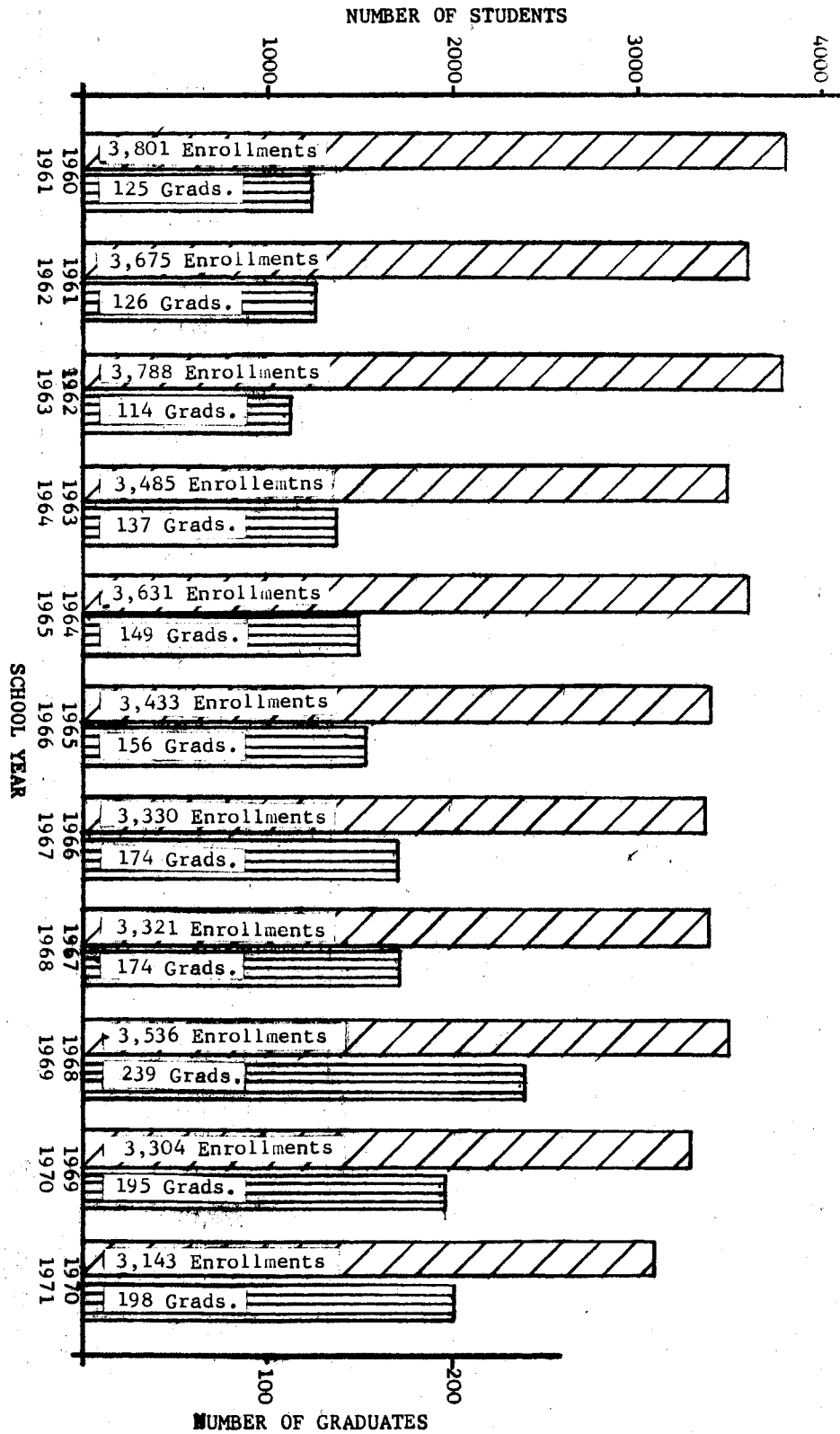


Figure 2. Enrollment and Graduate Data for Eleven Year Period - Tatum

Figure 3. Enrollment and Graduate Data for Eleven Year Period - Lovington





### Hobbs School District

Hobbs, by far the largest of the four school districts comprising the New Mexico Junior College District, does not show a decrease for the years 1960-71, but instead shows a six per cent increase with a peak year of 1964-1965 when the increase reached 13 per cent over 1960-61. From 1961 the number of graduates has risen in a fluctuating pattern to reach a 67 per cent rise in 1971, according to figures documented by Bill Blankenship, Hobbs High School Counselor (Figure 4).<sup>8</sup>

Although the total enrollment figures show a decrease from the peak year of 1964-65, actual decreases under the 1960-61 figures are reflected only in the first four grades of the system.

Transcript records show a six per cent fluctuation in graduates enrolling in higher education for the years 1967-1971, Blankenship reported.<sup>9</sup>

### Eunice School District

Figures of enrollment in the Eunice school system show a steady decline from the year 1960 through 1971 for the entire system, according to Mrs. Gwen Hahn, Registrar.<sup>10</sup> Significantly the first nine grades of the system have been affected by this decrease in enrollment (Figure 5).

Graduate figures, on the other hand, have experienced a 16 per cent increase in the same ten-year period, while a peak year was found in 1964-65 when graduate figures rose 35.5 per cent over 1960-61. From transcript records a five per cent fluctuation in higher education enrollees was found.<sup>11</sup>

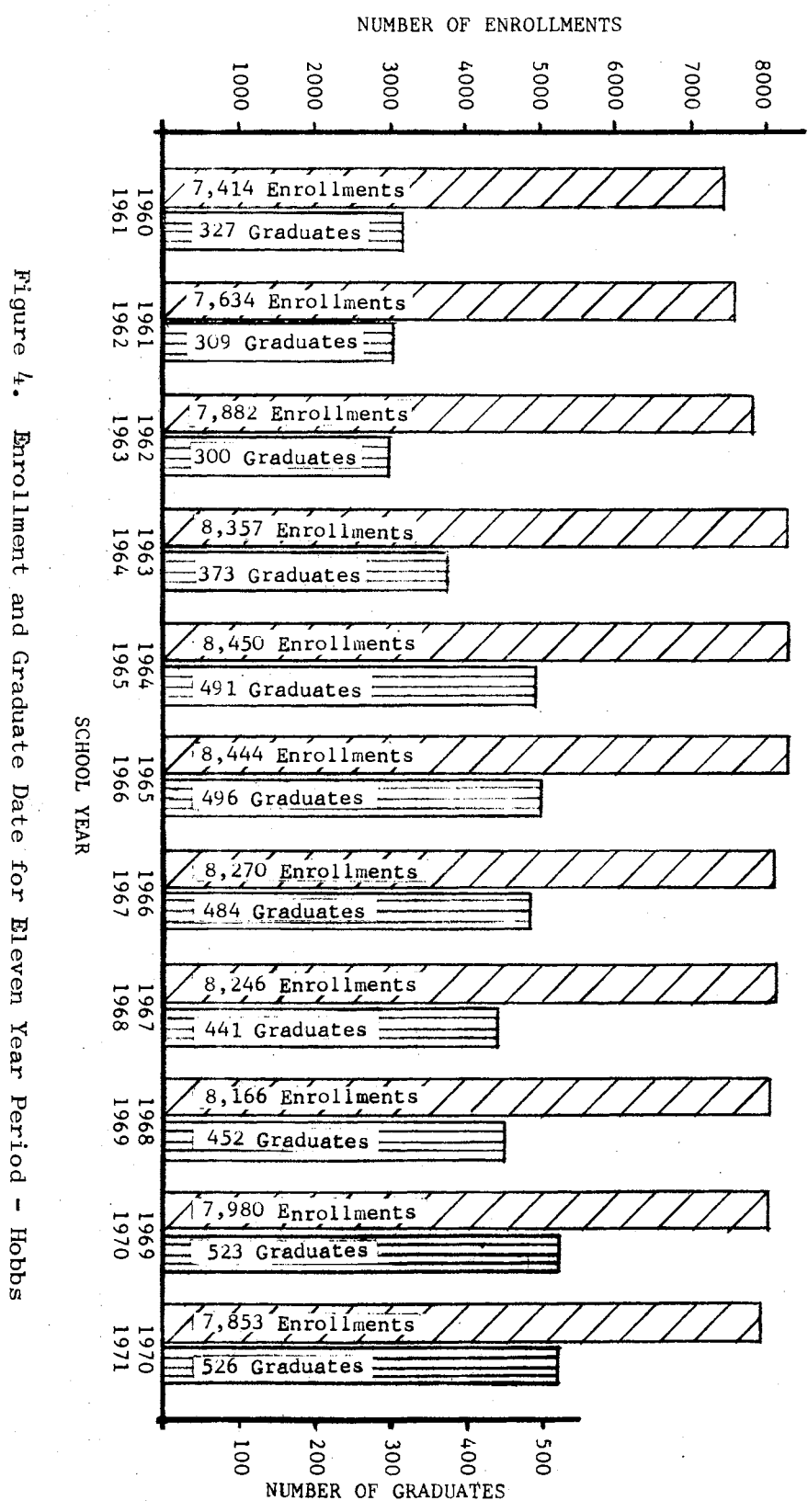
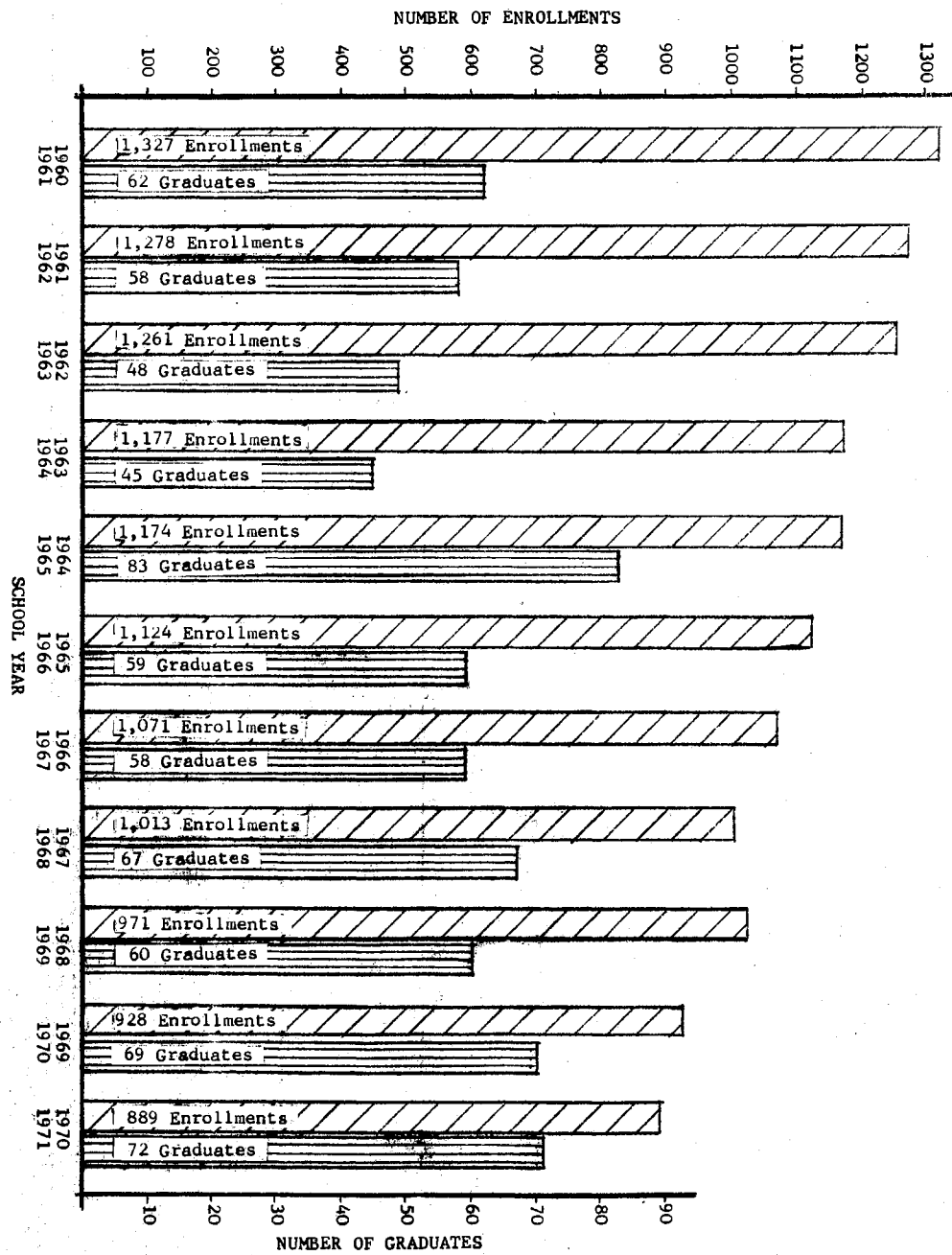


Figure 4. Enrollment and Graduate Data for Eleven Year Period - Hobbs

Figure 5. Enrollment and Graduate Data for Eleven Year Period - Eunice



In all four districts the boy-girl ratio in graduates was found to fall within a .06 range of 50 per cent. This is significant since the study was mainly concerned with male enrollment at New Mexico Junior College.

#### Junior College Statistics

Sources of information for the New Mexico Junior College were the BEF reports and actual class rolls from the Office of the Registrar. The year of 1966-67 was excluded from the study due to the unstable condition of the Vocational-Technical Department.

The percentage of women enrolled in the five disciplines for the years 1967-1971 constituted 1.35 per cent of total head count and was not considered significant by the author. The study, therefore, analyzed data pertaining only to male enrollment at New Mexico Junior College.

BEF records show that of an average of 735 in-district public school graduates for the years 1967-1970 an average 21 per cent became full-time students at New Mexico Junior College. A further breakdown of these in-district Junior College students shows that an average 25 per cent were males enrolled in the Vocational-Technical Department (Figure 6).

In-district FFE for 1971 was 294, an actual gain of 24 over the 1967 figures. At the same time in-district FFE male in the Vocational-Technical Department for 1971 dropped 21 per cent under the 1967 figure of 33 actual FFE. Yet in 1970, a peak year, the same category of enrollees gained 57 per cent over 1967.

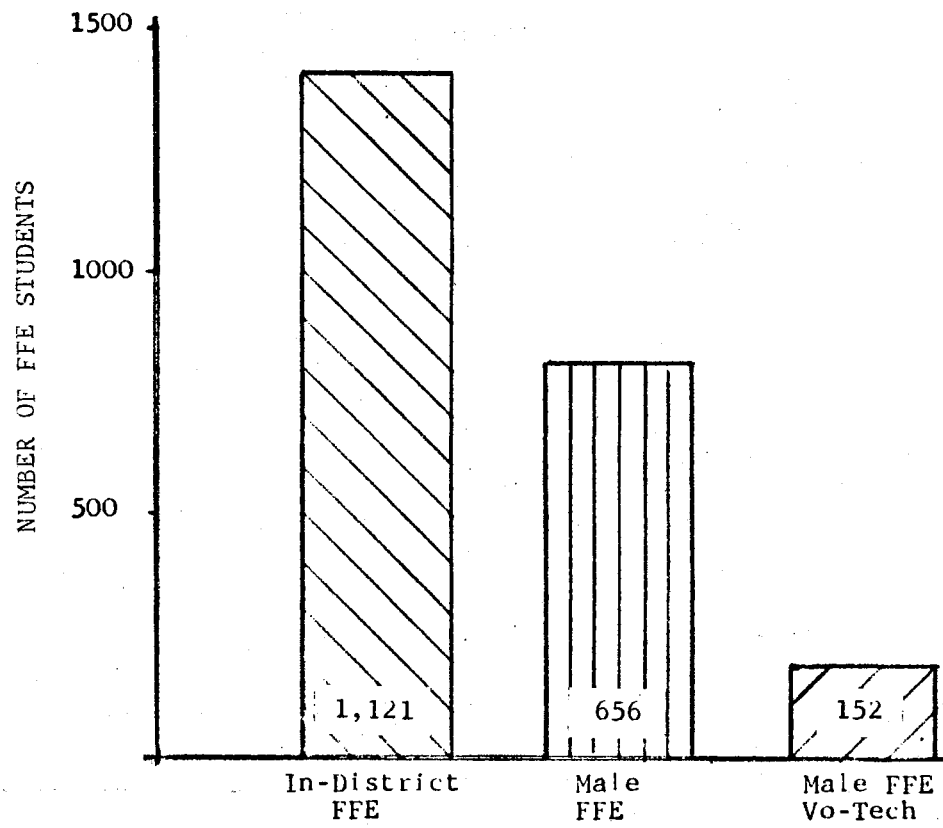


Figure 6. FFE at NMJC for Years 1967-1971

### Projected Statistics

Cumulative in-district high school graduate projections show a general decline through 1974 with a slight rise in 1975, as indicated in Table IX. According to the cohort-survival information the total in-district graduate numbers for 1975 will be 770.

Table X shows an increase over 1971 in male in-district FFE at New Mexico Junior College for the projected years, yet the increase does not reach peak 1970 figures. Although there is a decrease through 1975 the rate of decline is less.

In-district FFE in the Vocational-Technical Department shows a slight increase, according to Table XI, but again, it does not reach peak figures for 1970.

TABLE IX

PROJECTION OF PUBLIC SCHOOL GRADUATES THROUGH 1975  
TOTAL IN-DISTRICT

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Eighth	988	1016	923	1003	1066	1098	1126	1189	1212	1074	1035					.7440	12.5514**
Ninth	861	983	948	984	997	1023	1106	1116	1156	1081	1043					.7423	10.5486**
Tenth	716	753	894	1022	942	1014	984	1060	1116	1038	1079					.7576	23.8780
Eleventh	627	614	629	921	856	802	864	839	975	928	942					.8757	23.3248
Graduates	540	518	488	580	755	737	750	704	774	826	826	824*	817*	747*	770*		

\* Projected Graduates

\*\* Level of Significance 0.05

TABLE X

PROJECTION OF MALE FFE ENROLLMENT, NEW MEXICO JUNIOR COLLEGE  
FALL SEMESTER 1967-1975

	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
NMJC FFE Male	151	163	169	174	145	170**	168**	160**	159**	.2068	6.6509***
Total Public School Graduates in District	750	704	774	826	826	824*	817*	774*	770*		

\* Projected Graduates

\*\* Projected from the Projected Public School Graduates

\*\*\* Level of Significance 0.05



TABLE XI

PROJECTION OF FFE IN VOCATIONAL-TECHNICAL AREA  
IN-DISTRICT - MALES

	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
FFE VO-TECH	32	28	39	52	33	37**	37**	40**	39**	-	-
FFE NMJC	151	163	169	174	145	170*	168*	160*	159*	.2755	11.0917***

\* Projected Enrollment

\*\* Enrollment Projected from Projected Enrollment

\*\*\* Level of Significance 0.05

## FOOTNOTES

<sup>1</sup> Paul Richards, Principal, Tatum High School; O. G. Blackard, Assistant Principal, Lovington High School; Bill Blankenship, Counselor, Hobbs High School; Gwen Hahn, Registrar, Eunice High School, Personal Interviews, Hobbs, New Mexico, June, 1972.

<sup>2</sup> Leonard J. DeLargo and Henry F. Borgrink, State of New Mexico Annual Statistical Report of the Superintendent of Public Instruction: 1970-1971 (Santa Fe, 1971).

<sup>3</sup> Richards, Interview.

<sup>4</sup> Ibid.

<sup>5</sup> Ibid.

<sup>6</sup> Blackard, Interview.

<sup>7</sup> Ibid.

<sup>8</sup> Blankenship, Interview.

<sup>9</sup> Ibid.

<sup>10</sup> Hahn, Interview.

<sup>11</sup> Ibid.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to develop a mathematical method for projecting enrollment numbers at New Mexico Junior College. Data pertaining to population, industry, and school enrollment from the state, county, and junior college district was collected and analyzed.

#### Summary

In a review of various enrollment projection techniques several significant points were observed:

1. In order to plan realistically for an effective school curriculum, it becomes necessary to project enrollment numbers.
2. The fundamental need for making an enrollment projection for any specified area is knowledge of past history in that area.
3. All enrollment projections are based on certain assumptions derived from this historical data.
4. Uncertainties such as extent of migration, extent of attendance at public schools, percentage of high school graduates, levels and changes in occupational requirements, and local economic factors that influence employment or migration are difficult, if not impossible, to anticipate, and therefore, alternative projections are made for comparative purposes.
5. Any attempt to select an effective projection requires the making of successive projections and intimate knowledge of local conditions.
6. A final projection is never made, but instead successive projections are made until a target date is reached.

Data collected from the four public school districts revealed that:

1. Out-migration and population decreases within the county has not, as yet, affected enrollments in the public school districts.
2. While, as a whole, enrollment has decreased in the public schools, the number of graduates has increased in the past decade.
3. This increase in numbers of graduates from the four public school districts is not reflected in the five disciplines of the Vocational-Technical Department of New Mexico Junior College despite a national upsurge in vocational-technical education.

After investigating several methods of enrollment techniques the author found one method to be most functional for the Vocational-Technical Department of New Mexico Junior College. The steps of this method are:

1. Project, by means of the cohort-survival method, potential high school graduates of the four public school districts comprising the New Mexico Junior College District.
2. Project, by means of the survival ratio method, the potential in-district male FFE at New Mexico Junior College.
3. Project, by means of the survival ratio method, the potential in-district male FFE in the Vocational-Technical Department of New Mexico Junior College.
4. Ratios should be checked for goodness of fit by means of the chi-square or null-hypothesis criterion.

Results of the projections made by this method revealed that:

1. In-district public school graduate numbers will decrease slightly through 1975.
2. In-district male FFE at New Mexico Junior College will also decrease through 1975.
3. In-district male FFE in the Vocational-Technical Department will increase only slightly through 1975.

### Conclusions

In the next few years the out-migration of population from Lea County will begin to reflect in the graduate numbers of the public school districts. The decrease will not be sharp, but instead gradual as that of the lower grades has been.

New Mexico Junior College will not realize a decrease in enrollment numbers for several years, but unless the potential of vocational-technical education is fully utilized enrollment numbers in the Vocational-Technical Department will not increase substantially. In the immediate future the predictions show that male enrollment numbers in the Vocational-Technical Department will stay within a consistent range through 1975.

According to current data the five disciplines of the Vocational-Technical Department of New Mexico Junior College are not serving a capacity enrollment number. Grant Venn says this about vocational-technical education in two-year institutions:

Taken as a whole, American junior colleges do not give proper attention to the occupational education phase of their purpose. Less than a quarter of all junior college students are enrolled in organized occupational curriculum.<sup>1</sup>

The enrollment numbers in the five disciplines of the Vocational-Technical Department of New Mexico Junior College now seem to follow a trend. The trend centers on county population instead of industrial need. Later in this chapter the author will recommend steps to offset this trend.

This is not unique in New Mexico Junior College. Leland L. Medsker, as quoted in Man, Education, and Work, said of the junior college movement:

It is obvious from the data presented that the two-year college in America is focused more on the transfer than the terminal function. If, then, the institution is adjudged unique, solely on the basis of its special services to students that do not transfer, it fails to measure up.<sup>2</sup>

The model for predicting enrollment numbers outlined in this study does not indicate methods of improving enrollment, but it can indicate to the administrative officers the need for development of a system to increase potential enrollment in the five disciplines.

#### Recommendations

In the development of this study the author has realized the need for steps to increase enrollment in the five disciplines of the Vocational-Technical Department of New Mexico Junior College. The following steps are recommended in the development of such a program.

1. A mathematical model for predicting enrollment numbers, such as the method outlined in this study, should be used to predict future enrollments.
2. On the basis of these predictions a decision should be made whether or not enrollment development should be undertaken.
3. A perpetual evaluation of the department as related to the industrial needs and demands of the region should be instituted. In line with this a committee of communications could be set up between the college and the Lea County Industrial Development Board.

4. An in-depth program of information should be initiated. This does not only concern those who have already reached the secondary graduate level, but should apply to the earlier grades as well. Coordination between the college and the public schools would be an integral part of this program. The Massachusetts Institute of Technology has this to say about early introduction to vocational education:

. . . there is need, early in a student's schooling to replace the traditional divisions of education into separate disciplines by an educational pattern in which current categories of subjects are not readily identifiable. This should be initiated at the beginning of the junior high school program.<sup>3</sup>

Such a program of information would also be concerned with data for students, parents, and educators. The college should take the lead in setting up communications with regional industry, making available to potential students a guide to the regional occupational outlook. New Mexico Junior College now sponsors career days and scholarship programs. These could be preceded by dossiers of former students, stressing occupation, salary, and socio-economic position.

5. Perpetual evaluation of the counseling programs should be instituted. Workshops could be set up to keep the counselors and faculty, acting as advisers, aware of current trends in regional industry and education. Defining and evaluating of aptitude tests given in the public school districts should be a part of these workshops.
6. Programs, designed to produce a student proficient in a specific skill, should replace individual course offerings. These programs should be instituted on the assumption that to produce an Associate of Applied Science who can do the job is more beneficial than to produce a student who can be trained to do the job. Such a program has already been instituted at New Mexico Junior College in the two-year registered nursing curriculum. Industrial needs could be filled by the same type of program.
7. The population of Lea County should be made aware of the importance and need for vocational-technical education in today's society.

FOOTNOTES

<sup>1</sup>Grant Venn, Man, Education, and Work (Washington, 1968), p. 88.

<sup>2</sup>Leland L. Medsker, "The Junior College: Progress and Prospect," p. 112, quoted in Venn, Education, p. 89.

<sup>3</sup>Final Report of the Summer Study on Occupational, Vocational and Technical Education, 1965, Massachusetts Institute of Technology (Cambridge, 1965).



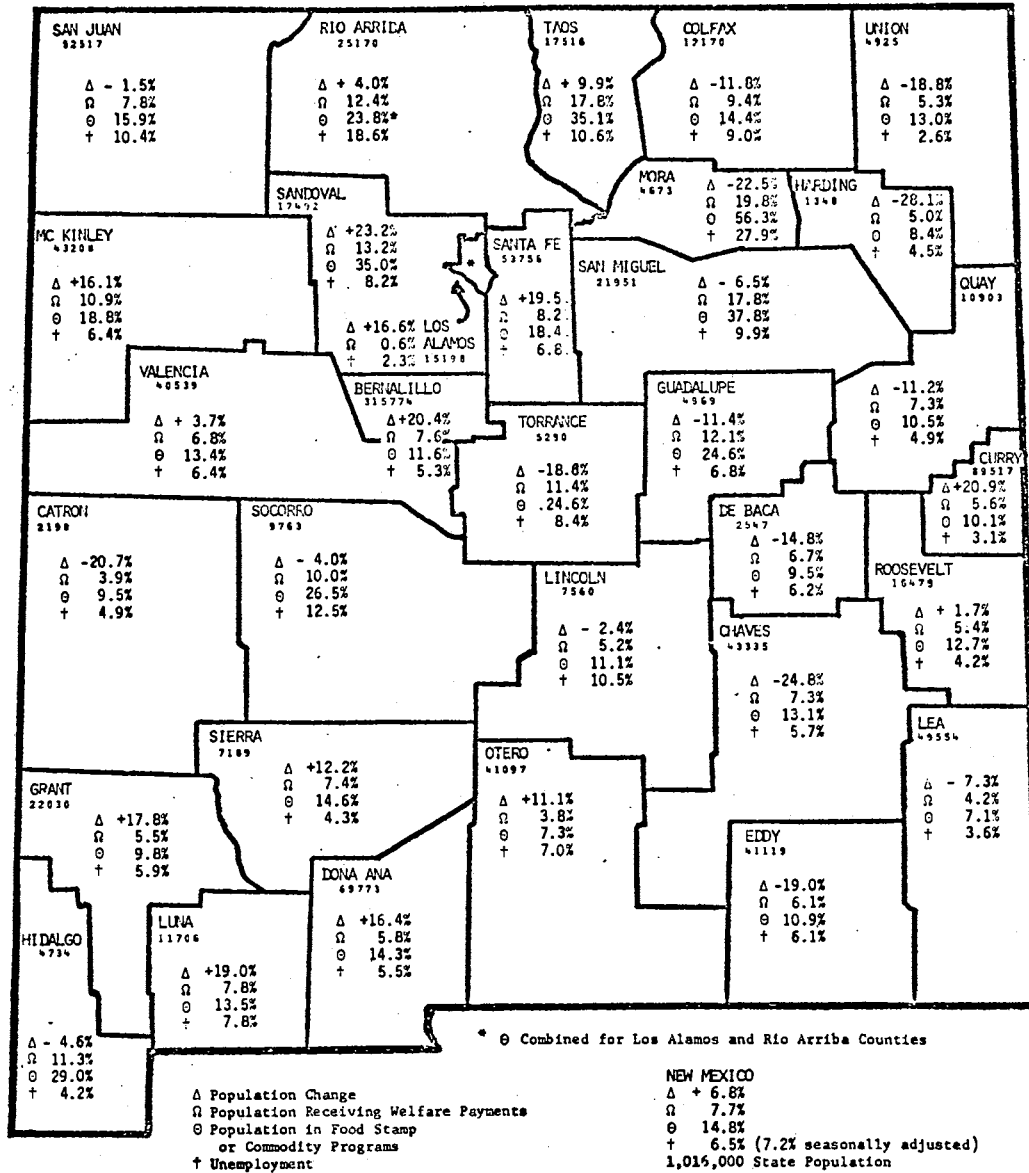
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APPENDIX A  
SCHOOL RECORDS

NEW MEXICO'S ECONOMIC STATUS



Small Figures 1970 County Population

## NEW MEXICO'S ECONOMIC STATUS (Continued)

	Civilian Workforce		Employed		Underemployed		Unemployment	
	No.	%	No.	%	No.	%	No.	% *
New Mexico	381,800	100.0	357,800	93.7	39,000	10.2	24,000	6.3
Anglo	263,000	100.0	252,500	96.0	20,400	7.8	10,500	4.0
Spanish Surname	93,400	100.0	83,300	89.2	13,700	14.7	10,100	10.8
Indian	18,300	100.0	15,700	85.8	3,600	19.7	2,600	14.2
Negro	7,100	100.0	6,300	88.7	1,300	18.3	800	11.3

\*Unadjusted

Note: Underemployment is figured as a per cent of the total workforce.

Source: Employment Security Commission of New Mexico: as of May, 1971.

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William C. Simms, Director  
Department of Development  
113 Washington Avenue  
Santa Fe, New Mexico 87501

Sources: Population Change: U. S. Bureau of the Census, 1970 Census of Population and Housing. Population Receiving Welfare Payments: New Mexico Health and Social Services Department, March, 1971; Population in Food Stamp or Community Programs: New Mexico Health and Social Services Department, March, 1971. Unemployment: Employment Security Commission of New Mexico, December, 1970.

Prepared by: Bureau of Business Research, ISRAD, The University of New Mexico.

UNEMPLOYMENT - WORK FORCE DATA

1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
WORK FORCE										
21,381	21,517	20,934	21,420	21,500	21,216	20,855	20,475	20,739	20,858	20,392
UNEMPLOYMENT										
726	711	625	667	625	682	698	641	584	570	847
UNEMPLOYMENT RATE										
3.4	3.3	3.1	2.9	3.2	3.3	3.3	3.1	2.8	2.8	4.2

COMPUTER PRINT-OUT DATA - FALL, 1967

	COLLEGE TRANSFER			VOC.-TECHNICAL			TOTAL		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
FRESHMEN	374	270	644	105	105	210	479	375	854
SOPHOMORES	84	69	153	7	9	16	91	78	169
OTHER COLLEGE	17	21	38	8		8	25	21	46
TOTAL COLLEGE CREDIT	475	360	835	120	114	234	595	474	1069*
NON-CREDIT	3	1	4	3		3	6	1	7
TOTAL	478	361	839	123	114	237	601	475	1076**

FULL-TIME EQUIVALENT

	COLLEGE TRANSFER	VOC.-TECHNICAL	TOTAL
COLLEGE CREDIT	620.3750	150.6250	771.0000
NON-CREDIT	.7500	.6250	1.3750
TOTAL	621.1250	151.2500	772.3750**

BEF REPORT - FALL, 1967

	COLLEGE TRANSFER			VOC.-TECHNICAL			TOTAL		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
FRESHMEN	298	198	496	76	109	185	374	307	681
SOPHOMORES	165	97	262	42	48	90	207	145	352
OTHER COLLEGE	14	13	27	3		3	17	13	30
TOTAL COLLEGE CREDIT	477	308	785	121	157	278	598	465	1063*
NON-CREDIT	5	8	13	2	1	3	7	9	16
TOTAL	482	316	798	123	158	281	605	474	1079**

FULL-TIME EQUIVALENT

	COLLEGE TRANSFER	VOC.-TECHNICAL	TOTAL
COLLEGE CREDIT	568.4375	209.4375	777.8750
NON-CREDIT	2.8750	.5625	3.4375
TOTAL	571.3128	210.0000	781.3125**



TATUM SCHOOL DISTRICT

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GRADUATING CLASS OF:

GRADE	1970	1969	1968	1967	1966	1965	1964	1963	1962	1961	1960
SEVENTH	42	50	43	40	41	60	48	45	57	53	46
EIGHTH	47	42	38	42	47	38	41	50	52	36	33
FRESHMEN	33	44	45	41	34	38	47	49	37	33	27
SOPHOMORES	40	48	44	30	35	41	43	39	24	29	40
JUNIORS	48	48	22	32	37	31	40	26	29	33	30
SENIORS	39	23	30	34	26	32	25	26	25	26	22
GRADUATING SENIORS	39	22	28	34	26	32	25	26	25	24	22

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PERMANENT CLASS ROLL - SPRING SEMESTER, 1972

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INSTRUCTOR--STAFF

DT 113 DRAFTING I SECT. 01 CR. HRS. 3

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STUDENT NAME	STUDENT NO.	
Beck, Frederick A.	453-90-4963	
Collins, Charles R.	585-22-5335	
Hatfield, Howard M.	235-76-1161	
Perry, Kenneth W.	585-42-7928	
Salazar, Edwin M.	585-03-1402	
Shockley, Hobert W.	432-72-9146	
Trujillo, Jerry J.	585-50-5674	
Tuck, Donald R.	443-54-9520	5-1-72 Withdrawal
Vandervoort, William	076-32-7768	
Walker, Edward K.	463-86-6687	
Ybanez, Lionel	562-84-9543	
TOTAL STUDENTS	12	

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ENROLLMENT - EUNICE SCHOOL DISTRICT

GRADE	1960	1961	1962	1963	1974	1965	1966	1967	1968	1969	1970	TOTAL	1971	1972	1973	1974
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	ACTUAL	1972	1973	1974	1975
1	202	167	151	119	131	119	95	87	76	68	66	1281	52			
2	141	160	139	116	100	97	100	73	75	69	71	1141	52			
3	143	125	143	107	103	93	88	90	72	72	66	1102	61			
4	126	136	135	133	98	92	93	90	82	73	75	1133	69			
5	125	117	116	115	132	98	78	83	90	110	69	1104	71			
6	109	118	111	105	112	131	90	77	75	89	78	1095	67			
7	99	83	106	96	100	97	125	80	88	73	85	1022	91			
8	111	96	72	101	91	98	93	119	87	71	70	1009	90			
9	71	101	87	74	96	78	101	95	116	85	66	970	73			
10	72	63	103	76	63	98	74	82	84	107	80	902	60			
11	66	54	50	89	65	64	76	70	76	71	91	772	69			
12	62	58	48	46	83	89	88	67	66	69	72	682	90			
TOTAL	1327	1278	1261	1177	1174	1174	1101	1013	971	928	889	12213	837			
H. S.	62	58	48	46	83	58	58	67	60	69	72	681	87	Total		
GRADS.	25	26	22	21	36	20	33	29	25	30	35	301	42	Girls		
	37	32	26	25	47	38	25	38	35	39	37	379	45	Boys		

APPENDIX B

INSTRUMENTS USED IN COLLECTION OF DATA

	Eunice	Hobbs	Lovington	Tatum	Jal	Other N. Mex.	Texas	Other
School District								
Graduates								
Per Cent Enrolling in College								
Number Enrolling in College								
Per Cent Enrolling in NMJC								
Number Enrolling in NMJC								
Percentage of Males Enrolling in NMJC								
Number of Males Enrolling in NMJC								
Percentage of Males Enrolling in Vocational-Tech Area								
Number of Males Enrolling in Vocational-Tech Area								

Year	1967	1968	1969	1970	1971	Total
Graduates - Boys						
Graduates - Girls						
Graduates - Boys and Girls Total						
Average Per Cent Enrolling in College						
Total Number Enrolling in College						
Number Enrolling at NMJC - Boys						
Number Enrolling at NMJC - Girls						
Total Boy-Girl Enrolling at NMJC						
Ratio: Boys to Girls Enrolling at NMJC						
Ratio: Boys Enrolling Vocational-Tech to all College						
Ratio: Boys Enrolling Vocational-Tech NMJC To All Boys Enrolling NMJC						

GRADE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Ninth																	
Tenth																	
Eleventh																	
Graduates																	

SURVIVAL RATIO - HOBBS

GRADES	61-62	62-63	63-64	64-65	65-66	66-67	67-68	68-69	69-70	70-71
1 - 2	.8913	.9146	.8501	.8877	.8504	1.1411	.8625	.8768	.8745	.8723
2 - 3	.9318	1.0121	.9473	.9540	.9304	.9160	.9707	.9564	.9680	.9677
3 - 4	.9544	1.0093	.9903	1.0138	.9839	.9470	.9914	.9849	.9430	.9635
4 - 5	.9593	1.0596	.9906	.9683	.9887	.9455	1.0078	.9826	.9610	.9667
5 - 6	.9713	.9795	.9499	1.0042	.9660	.9546	.9956	1.0014	.9524	1.0275
6 - 7	1.0424	1.0163	1.0327	.9907	1.0437	.9908	1.0474	.9913	1.0042	1.0061
7 - 8	.9740	.9435	.9870	.9624	.9640	.9405	.9553	.9408	.9543	.9416
8 - 9	1.0143	.9373	1.0415	.9934	.9700	.9613	1.0100	.9464	.9718	1.0889
9 - 10	.9304	.8929	1.1488	.9840	1.0888	.9783	.9727	.9886	.9448	.9972
10 - 11	.8807	.7939	1.0793	.8340	.8444	.8277	.8593	.8908	.8762	.8970
11 - 12	.8419	.7812	.9491	.8022	.8656	.9289	.8047	.8308	.8658	.8637
GRADUATES	.7859	.8673	1.0333	1.3163	.9287	.7842	.8822	1.0294	1.0995	.9273



DATA COMPUTER PRINT-OUT  
CHI SQUARE

CHISQ

532 635 598 627 608 647 697 703 689

310 491 456 389 427 454 497 485 474

CHI SQUARE = 24.53351878

RATIO = 0.6943863319

ACTUAL VALUES: 310 491 456 389 427 454 497 485 474

EXPECTED VALUES: 369 441 415 435 422 449 484 488 478

CHI SQUARE: 9.43 5.67 4.05 4.86 0.06 0.06 0.35 0.02 0.03

CHISQ

635 598 627 608 647 697 703 689

491 456 389 427 454 497 485 474

CHI SQUARE = 14.06903999

RATIO = 0.7058032283

ACTUAL VALUES: 491 456 389 427 454 497 485 474

EXPECTED VALUES: 448 422 443 429 457 492 496 486

CHI SQUARE: 4.13 2.74 6.58 0.01 0.02 0.05 0.24 0.3

CHISQ

598 627 608 65

v

47 697 703 689

456 389 427 454 497 48A5

v

5 464

v

74

CHI SQUARE = 9.400501565

RATIO = 0.6964324798

ACTUAL VALUES: 456 389 427 454 497 485 474

EXPECTED VALUES: 417 437 423 451 485 490 480

CHI SQUARE: 3.65 5.27 0.04 0.02 0.3 0.05 0.08

ENROLLMENT - HOBBS SCHOOL DISTRICT

GRADE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Ninth	532	535	598	627	608	647	697	703	689	726	675	668				.6964	9.4019**
Tenth	436	495	567	687	617	662	633	678	695	651	724	691				.6883	9.7328**
Eleventh	367	384	393	612	573	521	548	544	604	609	584	669				.7994	3.4828**
Graduates	291	257	268	310	419	456	389	427	454	497	485	473	535*	476*	465*		

\* Projected Graduates

\*\* Level of Significance 0.05

ENROLLMENT - EUNICE SCHOOL DISTRICT

GRADE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Ninth	71	101	101	87	74	96	78	95	116	85	66	73				.7326	3.3411**
Tenth	72	63	63	103	76	63	98	82	84	107	80	60				.7883	5.4128**
Eleventh	66	54	54	50	89	65	64	70	76	71	91	69				.9133	1.5169**
Graduates	62	58	58	48	46	83	58	67	60	69	72	87	63*	47*	54*		

\* Projected Graduates

\*\* Level of Significance 0.05

ENROLLMENT - LOVINGTON SCHOOL DISTRICT

GRADE	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Survival Ratio	Chi Square
Nnnth	225	210	214	236	255	264	267	273	307	267	261	246				.6855	5.9835**
Tenth	79	171	187	216	221	219	243	256	289	240	246	240				.7462	13.3056**
Eleventh	161	147	160	180	187	180	208	203	242	216	250	209				.8275	9.7220**
Graduates	125	126	114	137	157	156	171	159	227	181	194	207	173*	179*	169*		

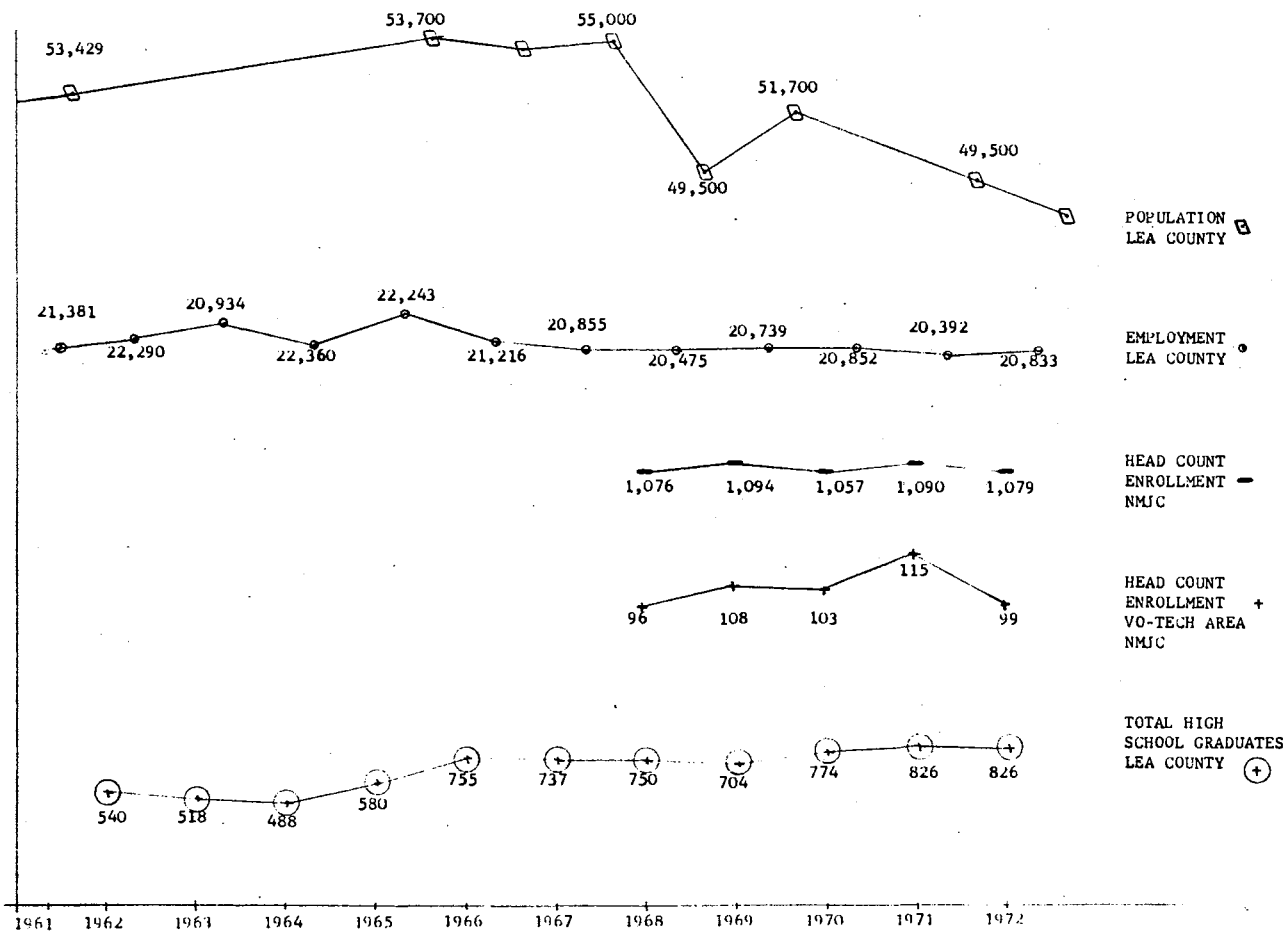
\* Projected Graduates

\*\* Level of Significance 0.05

TOTAL ENROLLEES-SOPHOMORE AND FRESHMEN-MALES  
FALL - 1967

RESIDENCE										
HRS	HOBBS	LOVINGTON	EUNICE	TATUM	JAL	OTHER	NM	TEXAS	OTHER	TOTAL
1										
2										
3	38	9	4		1	1		7		60
4	7		4					2		13
5										
6	31	5	5		7			3	1	52
7	21	2	2				1	1		27
8	3		2							5
9	38	6	8		4			2		58
10	6	1								7
11				1						1
12	24	7	7	1	2	1		3	2	47
13	21	8	3				3		3	38
14	16	6		2		1		2	1	28
15	25	5	13				2	3	1	49
16	35	15	8	4	3	11		3	9	88
17	40	26	9	5	8	5		5	4	104
18	12	5								17
19	2	1	1	1						5
20								1		1
21			1							
22	319	96	67	14	25	25		32	23	601

COMPARISON CURVE CHART



THE  $\chi^2$  DISTRIBUTION

d.f.	$\chi^2_{.05}$	$\chi^2_{.01}$	d.f.
1	3.841	6.635	1
2	5.991	9.210	2
3	7.815	11.345	3
4	9.488	13.277	4
5	11.070	15.086	5
6	12.592	16.812	6
7	14.067	18.475	7
8	15.507	20.090	8
9	16.919	21.666	9
10	18.307	23.209	10
11	19.675	24.725	11
12	21.026	26.217	12
13	22.362	27.688	13
14	23.685	29.141	14
15	24.996	30.578	15
16	26.296	32.000	16
17	27.587	33.409	17
18	28.869	34.805	18
19	30.144	36.191	19
20	31.410	37.566	20
21	32.671	38.932	21
22	33.924	40.289	22
23	35.172	41.638	23
24	36.415	42.980	24
25	37.652	44.314	25
26	38.885	45.642	26
27	40.113	46.963	27
28	41.337	48.278	28
29	42.557	49.588	29
30	43.773	50.892	30

VITA 2

Delois Glenn Gober

Candidate for the Degree of

Master of Science

Thesis: DEVELOPMENT OF A MATHEMATICAL MODEL FOR PROJECTING ENROLLMENT  
NUMBERS IN A NEW MEXICO JUNIOR COLLEGE

Major Field: Technical Education

Biographical:

Personal Data: Born in Wichita Falls, Texas, February 12, 1933,  
the son of Alvin C. and Virgie May Gober.

Education: Graduated from Wichita Falls Senior High School,  
Wichita Falls, Texas in 1951; attended Kilgore Junior  
College, 1956-1960; received the Bachelor of Science in  
Education degree from East Central State College, with a  
major in Industrial Arts, in 1967; completed requirements  
for the Master of Science degree in Technical Education at  
Oklahoma State University in December, 1973.

Professional Experience: Patternmaker for East Texas Steel  
Castings Company, Longview, Texas, 1955-1960; Truck Mechanic  
for Wilson McPherson Grain Company, Frederick, Oklahoma,  
1960-1964; Heavy Equipment Operator and Mechanic for  
J. B. Stallings Construction Company, Ada, Oklahoma, 1964-  
1967; Instructor of Drafting and Design at Connors State  
College, Warner, Oklahoma, 1967-1969; Instructor of Machine  
Tool, Metal Working, and Drafting at New Mexico Junior  
College, Hobbs, New Mexico, 1969-present.

Professional Organizations: American Institute of Design and  
Drafting, American Technical Education Association, Oklahoma  
Technical Society, Red Red Rose.