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A Projection of Student Enrollment in Industrial Arts at Old Dominion University 1978-1982

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A PROJECTION OF STUDENT ENROLLMENT IN INDUSTRIAL ARTS AT OLD DOMINION UNIVERSITY 1978-1982

A Study

Presented to

Dr. David I. Joyner

Old Dominion University

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by

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This research paper was prepared under the direction of the instructor in Problems in Education, ECIMI 536. It is submitted to the Graduate Program Director for Secondary Education in partial fulfillment of the requirements for the Degree of Master of Science in Education.

Approved, May 1978

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Chapter 1

INTRODUCTION

Student enrollment plays a major role in determining the funding level of an institution or program. Growth is measured in terms of enrollment. On the national level, the U.S. Office of Education and related agencies compile statistics from various sources. Statistical data from the past and present are used to project the broad needs of education, i.e., programs, teachers, and funding. These needs are based upon factors directly or indirectly related to the population and to student enrollment. (National Center for Educational Statistics 1977: 1). Federal funds are requested and allocated based on this projected data.

A similar process takes place at the state level. Again, enrollments play a major role in planning. State and federal funds for education are controlled and administered by the state agencies responsible for the various programs.

Old Dominion University, as an institute of higher education, is responsible to the State Council on Higher Education for planning the programs and needs of the university in support of its mission. (State Council on Higher Education 1974: 48). A parallel responsibility to the State Department of Education exists for vocational education programs receiving federal funding support (State Board of Vocational Education 1977: 21). University plans are based upon the needs of the various schools and programs. In this planning,

enrollment is a major factor in support of personnel and budget allocations.

The Industrial Arts Department at Old Dominion University has developed long-range planning that supports state and federal guidelines and reflects the direction for industrial arts in the future. The plan calls for program enrichment and growth (Department of Industrial Arts Education 1977). Recent enrollment reports have shown a decrease and tend to belie the growth planned by the department. An analysis of past and present enrollment and a projected enrollment is needed to support departmental long-range planning.

PROBLEM STATEMENT

The problem of this study is to establish a data base on enrollment in Industrial Arts at Old Dominion University through 1982. Data concerning industrial arts majors and graduates will be analyzed to identify a possible trend in enrollment. Questions which further delineate the problem and provide specific direction for the study are:

1. What has been the enrollment in industrial arts at Old Dominion University during the past 10 years?

2. What enrollment figures can be expected in industrial arts at Old Dominion University during the next 5 year period?

3. Can changes in FTE enrollment be attributed to scheduling and course offerings?

PURPOSE OF THE STUDY

The purpose of this study is to assist the Industrial Arts Department Staff at Old Dominion University in the preparation of long range plans. The

purpose of the study is two-fold:

1. To help the Industrial Arts Program Staff at Old Dominion University to more effectively validate the goals and objectives of long-range plans.

2. To assist the Industrial Arts Department Staff at Old Dominion University in identifying personnel and budget needs associated with long-range plans.

ASSUMPTIONS

The following are a list of assumptions used in this study:

1. Many factors affecting enrollment in industrial arts are common to other teacher preparation programs.

2. Federal and state guidelines affect program direction, emphasis and demand.

LIMITATIONS

The following is a list of limitations applied to this study:

1. Analysis of past enrollment will be limited to the graduates of the preceeding ten year period and to majors currently enrolled.

2. Analysis of enrollment will include Industrial Arts and Trade and Industrial (Occupational Education) courses of the past, present, and future.

DEFINITION OF TERMS

In order to clarify the meaning of terms associated with this study, the following definitions are provided:

1. Vocational education - that part of the total program of education which deals with preparation and training for careers below the professional level.

2. Industrial arts education - an educational discipline founded upon the body of knowledge known as industrial technology. One of the divisions of vocational education.

3. Trade and industrial education - that part of vocational education dealing with the industrial trades and related service occupations.

4. FTE - full-time equivalent. Expressed in terms of student FTE and faculty FTE according to the following formula:

UNDERGRADUATE

Student FTE = 15 student credit hours (SCH)

Faculty FTE = 15 students x 15 student credit hours

$$\frac{\text{Total undergraduate SCH}}{225} = \text{Faculty FTE}$$

GRADUATE

Student FTE = 12 student credit hours

Faculty FTE = 12 students x 12 student credit hours

$$\frac{\text{Total graduate SCH}}{144} = \text{Faculty FTE}$$

Chapter 2

REVIEW OF RELATED RESEARCH

Literature related to enrollment and enrollment projection was reviewed in order to determine procedures that had been used and the extent of information available for this study. A concentrated effort was made to identify studies dealing with vocational education and more specifically with industrial arts in institutes of higher education.

The literature reviewed is divided into the areas of national, state, and higher education. The sections which follow describe those aspects of recent literature and reports which relate to the rationale and the procedures used in identifying and projecting enrollment.

The Projections of Educational Statistics from the National Center for Educational Statistics reports that, if the present trend continues, changes can be expected in the period to 1985-86 as follows:

a. Enrollment in all public and private elementary and secondary schools will increase to a peak in the late 1970's followed by a decrease to below starting level by 1985.

b. High school graduates from all schools will slowly decrease to 1985-86.

c. FTE teachers in all regular schools will remain at essentially the same level through 1985 due in part to program enrichment, additional programs, and lowering pupil-teacher ratios.

d. Degree-credit enrollments in institutes of higher education will

increase to a peak about 1981-82 and remain constant through 1985.

e. Four year degrees granted by institutes of higher education will increase slowly but steadily through 1985. Earned masters degrees will increase at a greater rate.

f. FTE instructor staff for residence courses at institutes of higher education will slowly increase to 1980-82 and remain constant through 1985 (National Center for Educational Statistics 1977: Table 5, Table 27).

The projections use a population base taken from reports of the bureau of census. Projections by grade are derived by applying age-specific enrollment rates to six year olds and applying projected grade retention rates to children in grades 1-11. Institutes of higher education have enrollments which include resident and extension, day and evening, and full and part time students (National Center for Educational Statistics 1977: 16).

Public and private school enrollments are reportedly declining throughout the nation. Current forecasts indicate a reversal of the decline within a few years, but not uniformly. Some states and regions may for some time be dealing with declines at some levels and increases at others. Rarely will an individual state or region mirror the trend across the nation. Causes of the fluctuations in school enrollment include a combination of changes in the birth and fertility rates and changes in patterns of geographic mobility (National School Public Relations Association 1976: 2).

Projections for college level is more uncertain since enrollment is elective and less than half of the 18-21 age population are involved. Enrollment influences at the college level are changing attitudes toward education, financial

support for students, growth of the community colleges, and changes in admission practices (Suter 1972: 4). Other factors which will affect enrollment at this level are more flexible instructional schedules, increased adult counseling, more evening course offerings, encouragement for females to participate in non-traditional occupations, increased efforts in the area of minority recruitment, better dissemination of financial aid information, broad base of program offerings, better articulation with high school students, and personalization of the enrollment process (Smeaton and Wagner: 1976).

The Virginia Plan for Higher Education, January 1974, recognized a plateau in enrollment growth in the late 1970's and expected a decline by the early 1980's. The most rapid growth in Virginia was forecast to take place in the "urban corridor" extending from the Washington metropolitan area, south to the Richmond area, then southeast to the cities of Hampton Roads. That part of the population which provides the majority of college enrollment is the 18 to 21-24 age group. Projections estimated that the college-going rate of this age group would increase from 53 percent in 1972 to approximately 60-65 percent by 1982. These percentages were developed by dividing total enrollment (persons of all ages) by the 18-21 year old population base. This technique reportedly was widely used where age distribution of college enrollment was not precisely known. Projected enrollment for Old Dominion University through 1982 indicated a peak in undergraduate FTE enrollment during 1978 to be followed by a slow decrease of 6 percent to 1982. The projected undergraduate FTE enrollment for 1982 was still 4.5 percent above the projected 1976 enrollment. Graduate FTE enrollment indicated a steady increase

through that same period. The projected graduate FTE enrollment was approximately 46.0 percent above the 1976 level (State Council of Higher Education 1974: 45, 48-52, Table 13).

A 1972 projection of enrollments in Virginia public schools cited the number of births as the major factor in a forecast decline in enrollment. The number of births in Virginia was on a slow but steady increase since the low which occured in 1967-70. Based on this projection, enrollment in elementary grades would reach a low about 1978-79 and a corresponding low in high school graduates would occur about 1981-82. The low for higher education would occur about 1983-84 following a peak which should occur about 1977-78 (Division of Educational Research and Statistics 1972).

The Virginia State Board of Vocational Education foresees continued growth for vocational education programs. In the State Plan for Vocational Education, 78-82, enrollment in industrial arts will increase about 4 percent each year for a total increase of about 21 percent. Industrial arts programs are to expand from 460 to 600, an increase of about 23 percent. Actual and projected demand for industrial arts teachers indicates a continuing deficit (State Board for Vocational Education 1978: Table 4, Table 8A).

The Annual and Long-Range Improvement Plan, 1977-82, for the Virginia Industrial Arts Education Service tasks all industrial arts teacher education programs to increase enrollment to individual capacity in order to ensure that an adequate supply of industrial arts teachers will be available to Virginia school divisions by 1980 (Industrial Arts Education Service 1977: Objective 4.6).

The Annual and Long-Range Improvement Plan, 1977-82, for the Department of Industrial Arts Education at Old Dominion University includes provisions to fulfill the task assigned (Department of Industrial Arts Education 1977: Objective 1.3).

At the October 1977 Southeastern Conference of the American Industrial Arts Association, industrial arts supervisors of the represented states reported a total of 350 vacant teaching positions (22 vacant positions were reported in Virginia). These reported teacher shortages seem to contradict a national oversupply reported by the National Education Association (NEA Research Memo 1977-3). In actuality the contradiction supports the thesis that no state or region mirrors the nation and the oversupply exists somewhere other than in Virginia and the other southeastern states.

At Old Dominion University the Office of Institutional Studies maintains enrollment data and enrollment projections for the university, its schools and departments. The data and projections for Industrial Arts show a steady increase and growth until 1975. A decline occured in 1976 followed by a further decline indicated for fall 1977-78 (see Fig. 1).

SUMMARY

This chapter has presented a review of the research related to enrollment and enrollment projections. On the basis of the limited research and information found to be applicable to this study, some conclusions can be drawn. They are:

1. The enrollment question is central to the resolution of a number of

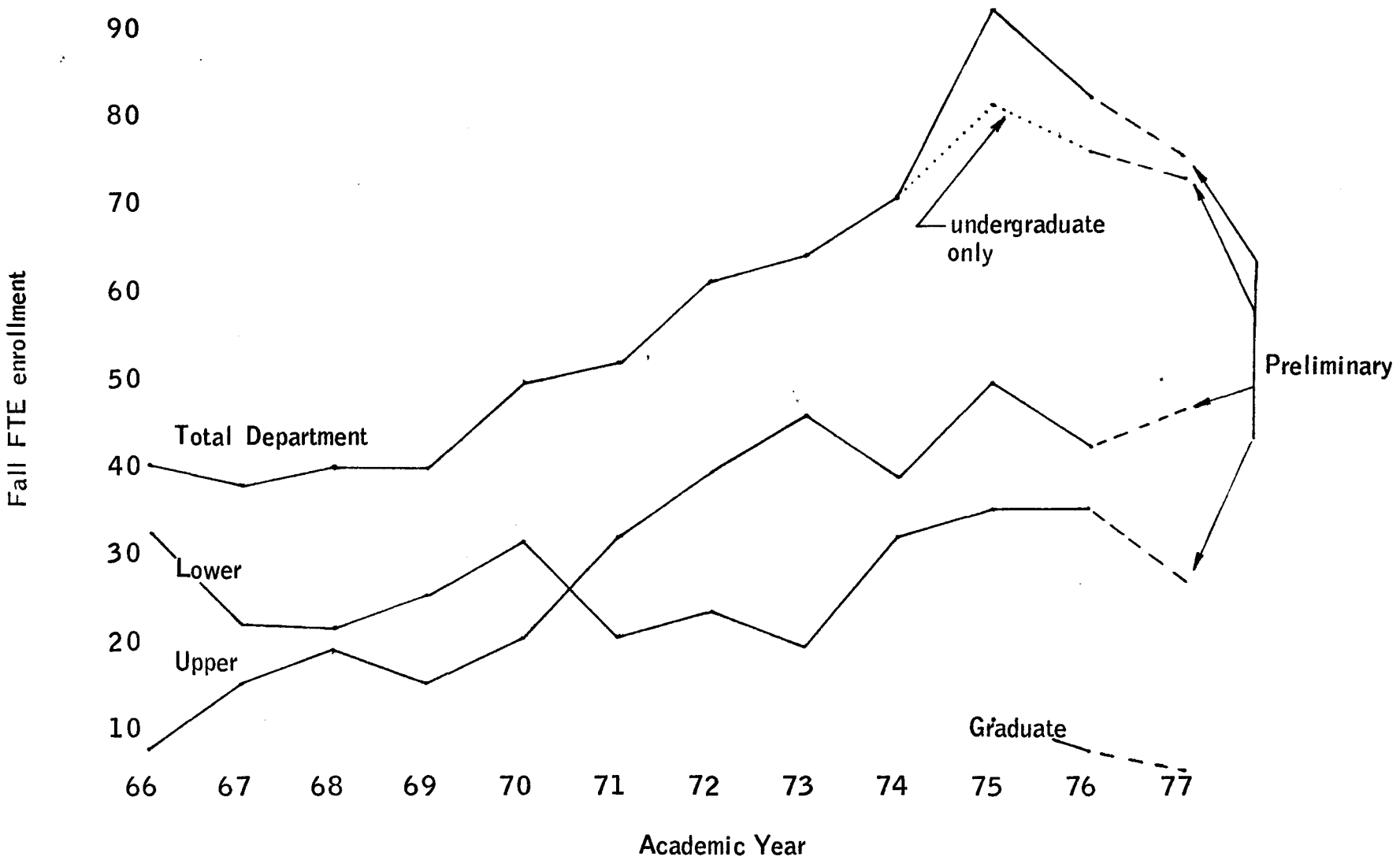

Fig. 1 : Fall FTE enrollment for the Industrial Arts Department, Old Dominion University.

issues facing higher education. Institutional growth and budget decisions are based upon the demand generated by future FTE enrollment.

2. There is no recognized formula for enrollment projections at the higher education level.

3. The current and projected shortage of industrial arts teachers in Virginia and surrounding states will support continued growth in industrial arts teacher preparation programs.

4. Continued growth at the university level will peak in the early 1980's but enrollments are not expected to decrease appreciably through 1985.

5. Enrollment based on population is commonly used in planning elementary and secondary school needs. Attendance is mandatory and allowance need only be given to numbers of children modified by factors for dropouts, deaths, and migrations.

6. FTE enrollment is commonly used in planning higher education needs. Economical and effective use of time, talent, and funds is based upon an efficient student-teacher ratio.

Chapter 3

PROCEDURES

Chapters 1 and 2 have presented the scope and objectives of the study and a review of related research. In Chapter 3, the identification and selection of data, procedures for the collection of data, and methods for analyzing the data are considered.

IDENTIFICATION AND SELECTION OF DATA

Population enrollments in themselves are not meaningful at the university level. University budget allocations are based on FTE enrollment data rather than the common headcount used at the elementary and secondary levels. To determine the size of FTE enrollment in Industrial Arts at Old Dominion University and the meaning of yearly changes, the following steps were taken. (1) course offerings that contribute to FTE enrollment were identified, (2) course tallies were reviewed for completeness and accuracy, (3) schedules and scheduling procedures were reviewed for possible impact, (4) available FTE enrollment data was collected and reviewed for completeness and accuracy, (5) the number of majors currently enrolled in the industrial arts programs was identified by level, and (6) the number of graduates from the industrial arts program each year was identified.

COLLECTION OF DATA

Course tallies, student credit hours, course schedules, and instructor

FTE data were available in department files and through the School of Education and Office of Institutional Studies. Data on industrial arts majors and graduates was obtained from the Office of the Registrar.

ANALYSIS OF DATA

The research questions posed in the problem statement were:

1. What has been the enrollment in Industrial Arts at Old Dominion University during the past 10 years?

2. What enrollment figures can be expected in Industrial Arts at Old Dominion University during the next 5 year period?

3. Can changes in FTE enrollment be attributed to scheduling and course offerings?

Fall FTE enrollment data was derived from total student credit hours and course tallies. Line graphs were prepared to graphically display fall FTE enrollment. Growth curves were determined from these charts and projected to provide probable future enrollment data. These projected curves were then compared to tabular projections derived from percentage adjustments to past FTE enrollments. Additionally, they were compared to growth curves derived from projections provided in university and state planning documents. Deviations were analyzed for impact and probable cause. Where significant changes occured in adjacent FTE enrollments, course offerings and schedules were analyzed to determine possible correlation with the FTE change. Summer course offerings and yearly graduation numbers were included in the analyzation process.

SUMMARY

This chapter has presented the methods and procedures used in compiling fall FTE enrollments and presenting them in a useful form for analysis and planning. Procedures used in the analysis included comparison of fall FTE's as a means of projecting FTE enrollment. These projections were then compared with FTE enrollment data developed by other university and state offices. Significant FTE changes were reviewed against course offerings, schedules, and losses due to graduations to determine possible correlation.

Chapter 4

RESULTS

This study sought to identify data concerning the industrial arts program and students which could be analyzed to identify a possible trend in enrollment. The research questions set forth in Chapter 1 were:

1. What has been the enrollment in industrial arts at Old Dominion University during the past 10 years?

2. What enrollment figures can be expected in industrial arts at Old Dominion University during the next 5 year period?

3. Can changes in FTE enrollment be attributed to scheduling and course offerings?

Data concerning each of these questions is treated separately in this chapter. Supportive information which was generated during the course of this study is presented in five sections. The first section includes a discussion of data availability. The second section presents available information on enrollment in industrial arts at Old Dominion University during the past 10 years. The third section deals with the analysis of available data. The fourth section is concerned with scheduling and course offerings in relation to enrollment. Section five is concerned with future enrollment.

Data Availability

Collection of enrollment data for the study was started with the school year 1966/67. Effort was concentrated on identifying course offerings; course enrollments (tallies); FTE enrollment; lists of majors, past and present; lists of

new students; and lists of students completing the program.

New Students. These records had not been kept and were not available. A record of new students was not critical to the study but would have served to identify new students as a factor of summer and/or fall FTE enrollment. The numbers of new students reflect the effectiveness of recruiting efforts and the overall status of the program.

Students completing the program would serve to identify degree candidates, students completing certification requirements, and students dropping from the program. The number of degree candidates by academic year was available from the office of the Registrar. Names of student teachers by semester and academic year were available from the student teaching office of the School of Education. Names or numbers of students dropping from the program have not been identified. Table 1 is a record of the numbers of graduating students and student teachers.

Students majoring in industrial arts. The department has long attempted to identify student majors and has maintained a listing by name along with a file on each student. This effort is accomplished through the faculties role as advisors. However, the departmental listing has not been kept current. It does not reflect students leaving the program and is tardy in listing new arrivals. The identification of majors is not an easy task. The problem of identification is felt campus wide and is the subject of renewed effort by the Office of the Registrar.

Course offerings and course tallies have not been maintained within the department files but are available from schedule books maintained in the university archives and from data being made available by the Office of Institutional Studies. The current program maintained by this office started with the academic

Table 1

NUMBERS OF GRADUATES AND STUDENT TEACHERS

Academic Year	Recorded Graduates*	Student Teachers
66/67	10	—
67/68	7	—
68/69	8	8
69/70	22	20
70/71	13	16
71/72	27	22
72/73	30	28
73/74	22	21
74/75	30	32
75/76	24	28
76/77	25	21
77/78	( )	23

* numbers do not include special students for certification only.

year 1975/76. Data prior to that date is incomplete.

FTE enrollment is a product of course tallies applied to the formula defined in chapter 1. FTE enrollments are determined from available records by the School of Education, The Office of Institutional Studies, and by the Provost. The FTE figures issued by these offices have varied slightly in the past. Computerized data available to all parties is producing more consistent results. Improved registration procedures will provide accurate course tallies and identification of on-campus graduate and undergraduate enrollments.

Past Enrollment

Enrollment figures and/or course tallies were not available prior to the 1975/76 academic year. Course offerings were compiled and are on file for academic years 1966/67 to the present. Starting with the academic year 1975/76 course tallies have been added. Table 2 shows course offerings and tallies for academic year 1974/75 to 1977/78, in numerical order. Table 3 shows the same information but arranged by program area. Both Table 2 and 3 present information on on-campus core curriculum courses and represent those considered to directly affect FTE enrollment. Table 4 is a summarization of Tables 2 and 3 showing the number of students served in the average year for each course. Table 5 states this information in generalities in an effort to arrive at numbers which correlate with students completing the program. This correlation may equate to an estimate of program capacity and may reveal other useful evaluative information.

Table 2

COURSE OFFERINGS AND TALLIES (On-Campus Core Requirements)

Course No.	1974 75 Su	F	S	75 76 Su	F	S	76 77 Su	F	S	77 78 Su	F	S	78 Su	F
101	x				40	31		33			28			
111	x	x^2	x	x	20	23	c	39	25	7	22	23		
121	x	x			47	21		21	21		17	17		
221	x		x		20	18		9	23		c	25		
222	x	x		x	25		15	23	22	c	14		x	
231	x		x	x		22			24			26		
241	x	x			29			32			42			
242	x		x			23			25			34		
243				x	c		23	13		13	11		x	
250	x	x	x		20	27		22	14	11	11	18		
305	x	x		x	15		16	20		15	13		x	
306	x		x	x		14	17		16	15		11	x	
321					27			29			30			
351			x			17		13	25			22		
361		x			13		9	16			17			
362			x						7			16		
381	x	x	x	x	91	71	59	65	80	67	78	79	x	
385			x	x	38	49	18	49	52	8	42	53	x	
386					23	15		7			18		x	
387									10	c	11	15		
395	x	x	x			16			17	11	c	18	x	
410		x		x	12		c	14	18	c	25			
411		x			30			22			12			
412		x	x				17		10			13		
413			x			13			23			13		
495							13		10	10		20	x	

x offered

x^2 offered in two sessions

c cancelled

Table 3

COURSE OFFERINGS AND TALLIES (Core Requirements by Area)

	Course No.	1974 Su	75 F	75 S	75 76 Su	76 F	76 S	76 77 Su	77 F	77 S	77 78 Su	78 F	78 S	78 Su	F
PROF.	101	x				40	31		33			28			
	305	x	x		x	15		16	20		15	13		x	
	306	x		x	x		14	17		16	15		11	x	
	395	x	x	x			16			17	11	c	18	x	
COMMO	111	x	x[2]	x	x	20	23	c	39	25	7	22	23		
	222	x	x		x	25		15	23	22	c	14		x	
	250	x	x	x		20	27		22	14	11	11	18		
	351			x			17		13	25			22		
	412		x	x		29		17		10			13		
ENERGY	241	x	x						32			42			
	242	x		x			23			25			34		
	243				x	c		23	13		13	11		x	
	361		x			13		9	16			17			
	362			x						7			16		
	410		x		x	12		c	14	18	c	25			
PRODUCTION	121	x	x			47	21		21	21		17	17		
	221	x		x		20	18		9	23		c	25		
	231	x		x	x		22			24			26		
	321					27			29			30			
	411		x			30			22			12			
	413			x			13			23			13		

x offered

x^2 offered in two sessions

c cancelled

Table 4

COURSE TALLIES FOR CERTAIN CORE COURSES - 3 Year Summary

Course No.	75/ 76	76/ 77	77/ 78	3yr Tot	3yr Avg.
101	71	33	28	132	44
111	43	71	45	159	53
121	68	41	34	143	47
221	38	32	25	95	32
222	40	45	14+	99+	33+
231	22	24	26	92	31
241	29	32	42	93	31
242	23	25	34	82	27
243	23	26	11+	60+	20+
250	47	47	29	123	41
305	31	35	13+	79+	28+
306	31	31	11+	73+	24+
321	27	29	30	86	28
351	17	38	22	87	29
361	22	16	17	55	18
				78	26
362		7	16	23	8
395	16	28	18	62	21
410	12	32	25	69	23
				109	36
412	17	10	13	40	13
411	30	22	12	64	21
				113	38
413	13	23	13	49	16

+ Summer 78 enrollment yet to be added

Table 5

AVERAGE YEARLY COURSE TALLY BY AREA (1975-1977)

AREA	Course No.	Tally	Comment
Communication	111	45-50	Some non-IA majors included.
	222 250	35-40	
Energy Systems	241 242 243	25-30 *	Consistent
Production	121	35-40	Some non-IA majors
	221 231	25-30 *	
Advanced Areas	321 351 361/2	25-30 *	
Professional	101	30-35	
	305 306	25-30 *	Consistent
	395	22	Low
	410 411 412 413	35-40	These numbers include graduate students

* Correlates with graduating seniors for corresponding years.

Analysis of Data

By tradition the academic year includes the fall, spring, and following summer. Since fall is the traditional starting semester of a degree program, the fall FTE has been used to record and/or reflect the progress of the program and status of program enrollment. The industrial arts enrollment is in large part made up of transfer students from other programs or institutions. These students may enter the program at other than the fall semester - the summer sessions have attracted military and veteran students. A large number of these students complete the program and graduate in less than the planned for four year period. Service or elective courses offered by the industrial arts department (IAED 381, 385, 386, 387) produce a consistent FTE upper level enrollment. Lower level courses offered during summer sessions may attract new students and could affect the succeeding fall FTE. This possibility was explored by placing the summer session as first in sequence in a modified academic year. This is reflected in discussion of some of the individual courses.

Tables 2 and 3 show course offerings for the academic year numerically for 1974/75 through 1977/78. Class tallies are shown numerically for 1975/76 and subsequent. Figure 1 displays the fall FTE for the industrial arts department as recorded by the Office of Institutional Studies. The decline in FTE over the past two years is emphasized by the high peak of 1975. A possible explanation of this pattern can be found in Table 2. In the fall 1975 IAED 101 was scheduled for the first time since the summer of 1974 accounting for the abnormally high enrollment (40). After a history of being scheduled

in spring and summer sessions, IAED 221 was scheduled in the fall adding another 20 enrollments. IAED 385 - tested the preceeding spring and summer - was found to warrant a double section providing an additional 18 of the 38 total enrollment. IAED 386 was offered after a prolonged absence, was well recruited, and added 23 enrollments. When the data of Figure 1 was revised to remove the influence of these factors, the line graph took a new shape as shown in Figure 2. Removing the graduate FTE made a further change to the graph. These changes, shown in Figure 2, serve to reduce the dramatic impact of the reduction in FTE shown in the original graph. In addition, industrial arts programs have traditionally attracted mature students and military veterans. The change in FTE enrollment recorded in the 1975/76 school year may reflect a change in military veteran input as a result of cessation of hostilities in Vietnam and a resultant change in military posture. Such cosmetic changes, as shown in Figure 2, alter but do not refute the facts shown in Figure 1. As shown in Tables 2, 3, and 4 courses such as IAED 101, 221, 222, and 243 indicate a decrease in FTE enrollment for the fall 1977 semester. Figures 1 and 2 confirm that fall FTE has reached a probable plateau and is on a possible decline.

Another possible tool for projection is shown as Figure 3. The pattern of upper level FTE was found to correlate with the pattern of lower level FTE when offset three school years. No explanation of the offset is offered, however, if the pattern were to continue it would indicate that upper level FTE can be projected three years based on lower level FTE. Figure 3 reflects this projection.

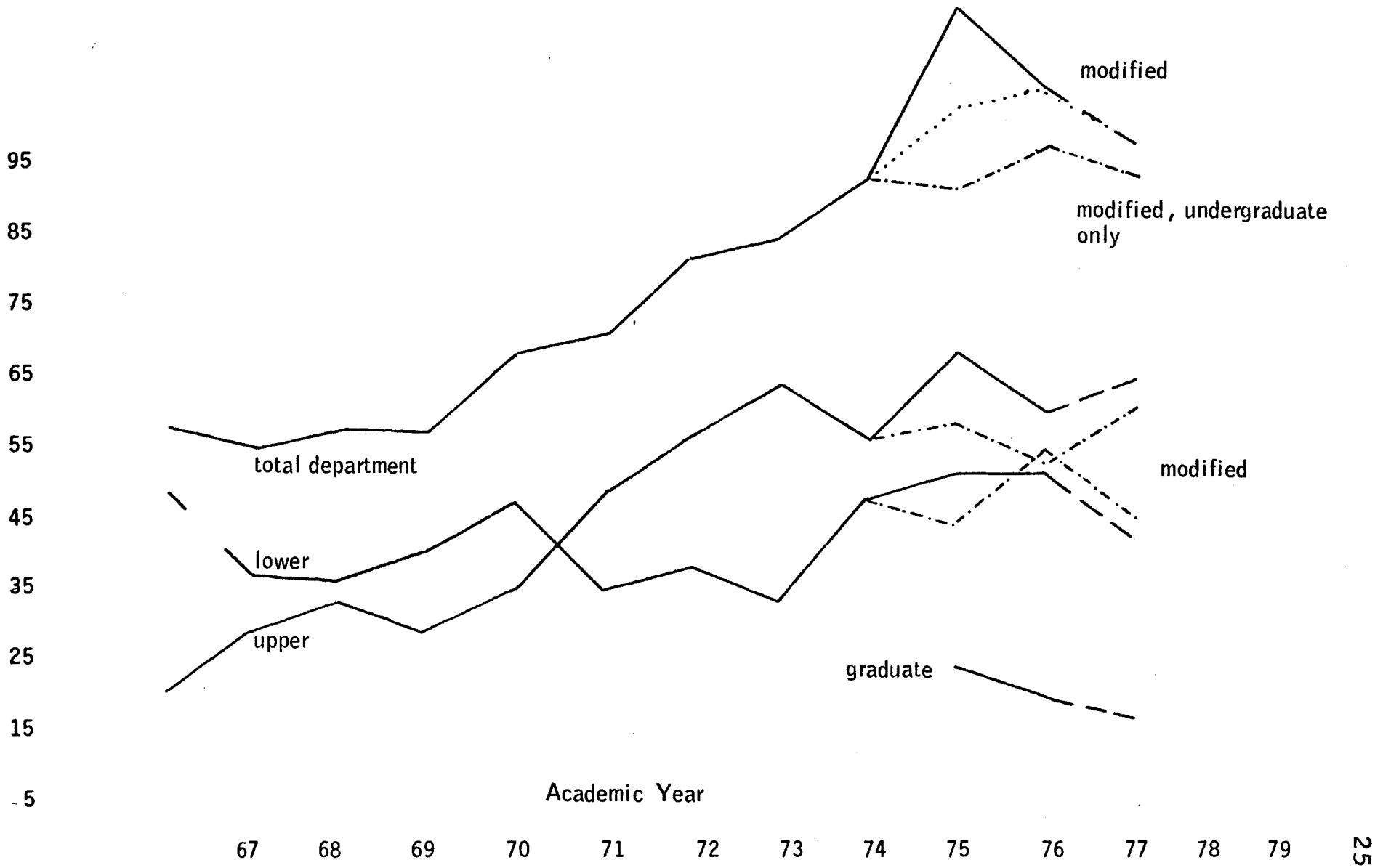

Figure 2: Modified Fall FTE enrollment for the Industrial Arts Department, Old Dominion University

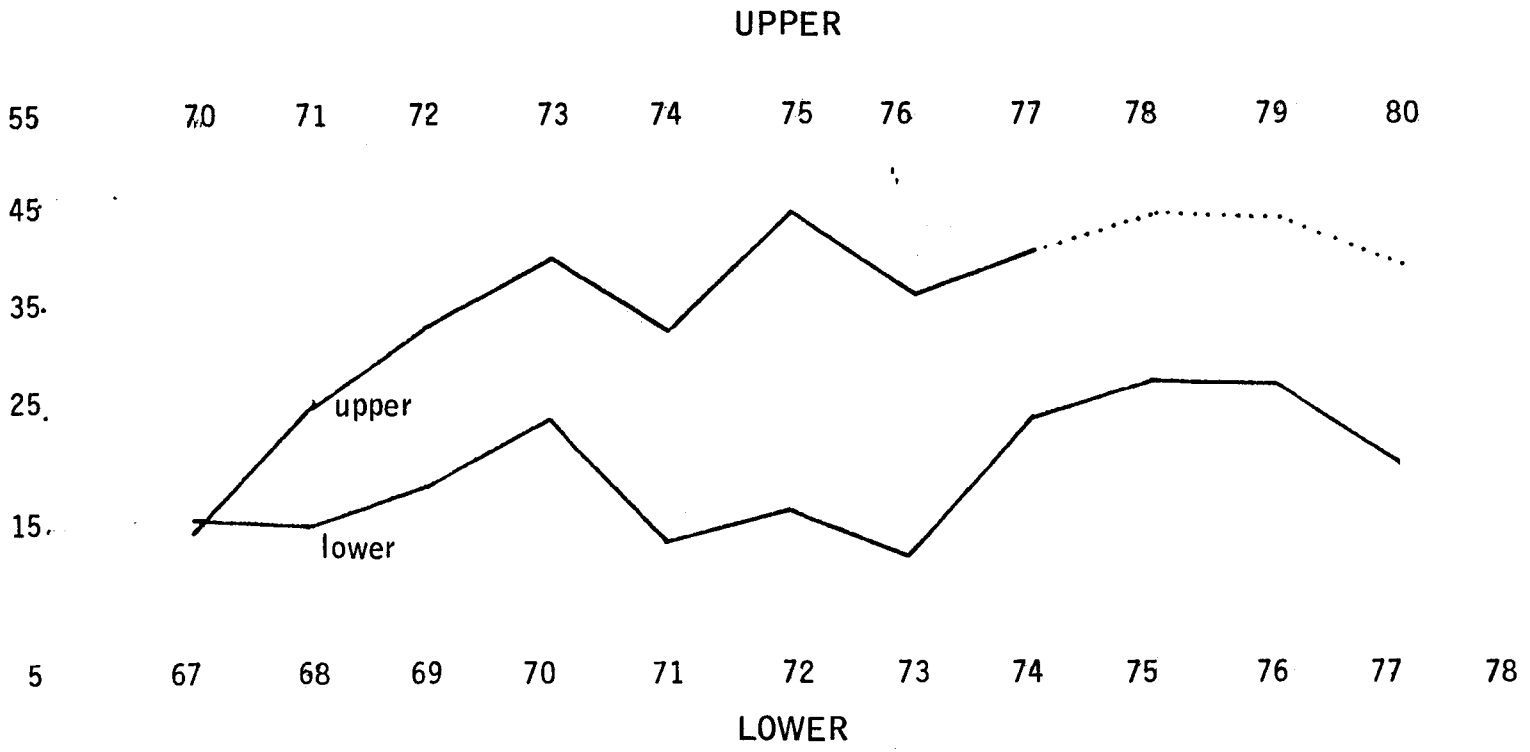

Figure 3: 3 year offset of upper/lower FTE enrollments for Industrial Arts at Old Dominion University using data from Figure 1.

Scheduling Practices

The industrial arts program has traditionally interested mature students and military veterans. The industrial arts enrollment has been in large part made up of transfer students from other programs and institutions. These students have entered the program at other than the fall semester. Industrial arts courses have served as electives for other students. These factors require flexible scheduling in order to meet the needs of students. Such scheduling practices may not serve to reflect the highest fall FTE. However, no real evidence was found to indicate that summer session scheduling had affected fall FTE. The industrial arts curriculum has been changed over the past years in both course numbers and course content. Some courses have been consolidated and new courses have been added to the curriculum. The current curriculum was placed in effect during the first semester of the 1975/76 academic year. A review of scheduling practices does reveal patterns that may have a combined effect on FTE. Those courses which have consistently followed a scheduling pattern have produced consistent enrollments. IAED 231, 241, 242, 305, 306, 321, 361/362, and 411/413 are examples of this attention to scheduling. Their enrollment performance is shown in Tables 2 through 5. A review of Tables 3 and 5 reveal the following comments concerning selected courses.

IAED 101 - Introduction to Industrial Arts.

Intended as a fall offering, this course has performed best when scheduled in that semester. The offering in summer 1976 compensated for failure to schedule the course in fall 1974. Students that should have scheduled this course in fall 1974 were delayed one year and joined with new students for the fall 1975 offering of the course. This caused an overload and resulted in the re-scheduling

of the course in the following spring 1976 semester. With the exception noted above and an occasional summer offering, this course has been reasonably stable with an average enrollment of 30-35 students per academic year.

IAED 111 - Communications: Drafting and Design.

Enrollment in this course is limited by the number (20) of work stations available. Fall and spring offerings of this course have filled consistently. Summer offerings have produced only a minimum enrollment. The yearly average enrollment of 45-50 students indicates that the course may serve as an elective for a number of students (non-industrial arts majors).

IAED 121 - Manufacturing/Construction: Materials Processes I.

Intended as a fall offering, this course indicates a similar demand and enrollment as IAED 111. Fall and spring offerings have produced similar enrollments. The heavy enrollment in fall 1975 was probably due to the failure to schedule the course during spring 1975. The yearly average enrollment (40-35) has been on the decline, yet, is high enough to indicate that the course may serve as an elective for a number of students (non-IA majors).

IAED 221 - Manufacturing/Construction: Materials Processes II.

Intended as a spring offering, enrollment for this course indicates the demand as a regular offering during that semester. Fall enrollment has been declining and unreliable. The yearly average enrollment of 25 students correlates with other core required courses and the program student load.

IAED 231 - Manufacturing/Construction: Materials Processes III.

Intended as a spring offering, this course - the last in the series of three basic production courses - has been regularly scheduled during the spring

session. The course has consistently served an average of 25 students. This correlates with other core required courses and the program student load.

IAED 222 - Communications: Basic Graphic Arts.

Enrollment in this course - one of the basic communications series - is limited by the capacity of the facility. The course has been variably scheduled and has produced a variable enrollment. Yearly average enrollment would appear to correlate with other core required courses and the program student load. However, a strong enrollment in the summer 1978 session is needed to balance a low (14) fall 1977 enrollment in order to maintain the yearly average.

IAED 250 - Communications: Basic Photographic Processes.

Enrollment in this course - one of the basic communication series - is limited by the capacity of the darkroom facility. When scheduled in the fall and spring only, enrollment has been fairly consistent. Yearly average enrollment (35-40) has exceeded the average for other core required courses. This may indicate that the course serves as an elective for a number of students (non-IA majors).

IAED 241/242 - Energy Systems I and II.

Intended as a fall/spring series, these courses - two of the three basic energy courses - have enjoyed a consistent and closely watched scheduling. The enrollment of these two courses has responded with equal consistency. Yearly average enrollment of 25-30 students correlates with core courses and the program student load.

IAED 243 - Energy Systems III.

This course - the third in the series of energy courses - has been

scheduled in a more flexible pattern than IAED 241/242 and its enrollment has responded in like manner. Often scheduled in the summer, the fall enrollment following has always been lower. The course has been used during summer sessions to support students in the summer school schedule. However, in doing so it may well have reduced FTE enrollment in the fall of the academic year.

IAED 305/306 - Curriculum Elements and Practices in Industrial Arts Education.

Intended as a fall/spring series, these two in the series of professional courses have enjoyed close attention to scheduling and advising effort. They have responded with equally consistent enrollment. Although used during summer sessions to provide scheduling opportunity for students the consistency of enrollments indicates the close attention afforded these courses. Yearly average enrollment (25-30) correlates with the program student load.

IAED 351 - Communications: Advance Graphic Arts.

Intended as a spring offering, this course has been scheduled with fair consistency in the spring session. Although it is one of the core curriculum courses it does not appear to produce the average student enrollment expected in this area.

IAED 361/362 - Energy: Advance Electronic Communication and Control.

These courses have been scheduled as a fall/spring series with an occasional summer offering of one of the pair. Enrollment has been steady indicating close attention to scheduling and advising effort. The yearly average enrollment of these courses as a series (25-30) correlates with the program student load.

IAED 321 - Manufacturing/Construction: Advance Manufacturing Technology.

Intended as a fall offering, this course has been consistently scheduled and has produced consistent enrollment. The yearly average enrollment (25-30) correlates with the program student load.

IAED 41X - Series.

IAED 410 - Methods of Teaching Energy Systems. A fall offering.

IAED 411 - Methods of Teaching Manufacturing. A fall offering.

IAED 412 - Methods of Teaching Communications. A spring offering.

IAED 413 - Methods of Teaching Construction. A spring offering.

These courses are offered for undergraduate and graduate credit and enrollment numbers reflect this student make-up. The undergraduate curriculum requires one course in this series; therefore, students elect the methods course in their area of interest. Accordingly, the average yearly enrollment for all four of these courses correlates with the program student load. IAED 411/413 have been offered as a fall/spring series. Scheduling and enrollments have been consistent. IAED 410/412 have been planned as fall/spring offerings but scheduling has not been consistent and enrollments have varied. Summer offerings of IAED 410 have not been successful.

Future Needs

Industrial arts has been by tradition a part of general education. General education provides knowledge and experiences for all students. It has long been one of the objectives of industrial arts to provide orientation and exploration experiences for students to aid them in making meaningful choices in the selection of occupations and their future. As the interest in vocational education developed within our society it was recognized that such exploration was needed for a student to select his or her area of vocational interest. Accordingly, industrial arts has been tasked by the State Board of Vocational Education within the State of Virginia to provide the orientation and exploration courses for the vocational education areas. For this reason, industrial arts has the dual role of providing for the general education of students and providing pre-vocational guidance and information for all students in the secondary programs. Long-range plans of the State Board of Vocational Education and of the Industrial Arts Education Service include these tasks and reflect a level and time reference for their achievement.

The vocational education plan makes repeated reference to the role to be played by industrial arts and publishes within their tables certain information and objectives intended to guide our service. In Table 3 of that plan, entitled Annual 5-year Planning and Budgeting, sub-strategies 10.1 and 10.2 state that teachers will complete pre-service and in-service education programs through teacher education institutions. The tables included in this reference indicate that the demand for teacher training programs in industrial arts and

trade and industrial education will show continued growth through 1982. This continued growth in teacher training programs is indicated in the line graphs presented herein as Figure 4. In this figure the line defining trade and industrial education teachers steadily declines from 1978 through 1982. This is to indicate that those teachers in secondary schools now operating on vocational certificates will have been upgraded and their numbers will reach a low level in the 1982 period. The in-service role of industrial arts to support trade and industrial education will continue to increase during the same period.

In Table 4 of that plan, entitled "Projection of State Enrollments", the number of students to be enrolled in secondary, post-secondary, and adult programs are listed. These numbers show a continuing increase in enrollments in industrial arts and trade and industrial education through 1982. This continued growth pattern in secondary school enrollments in the areas directly affecting industrial arts is indicated in the line graphs presented herein as Figure 5.

In Table 8 of that plan, entitled "Actual and Projected Demand for Vocational Education Personnel Preparation and Development", numerical data is presented for the industrial arts and trade and industrial areas. The many figures are presented as Demand and Supply and the difference is shown as a Deficit. Both Demand and Supply indicate steady growth throughout the states secondary school divisions. A Deficit of from 5 to 7 teachers is shown for each year through 1982. These are planning deficits based on the reported capability of the teacher education institutes throughout the state. This continued growth in demand for teachers is shown in the line graphs presented as

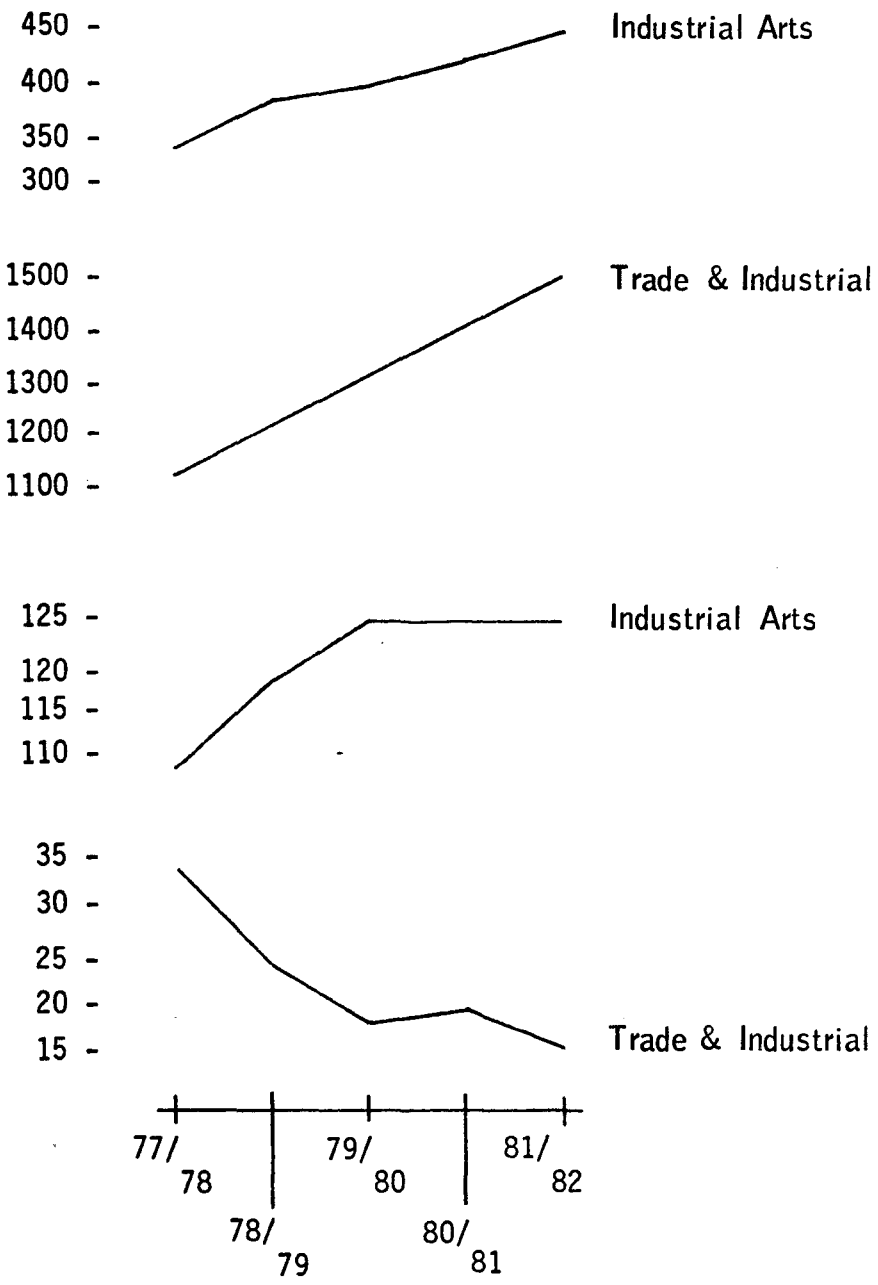

Figure 4: Projection of teachers completing in-service and pre-service education through teacher education institutions in Virginia.

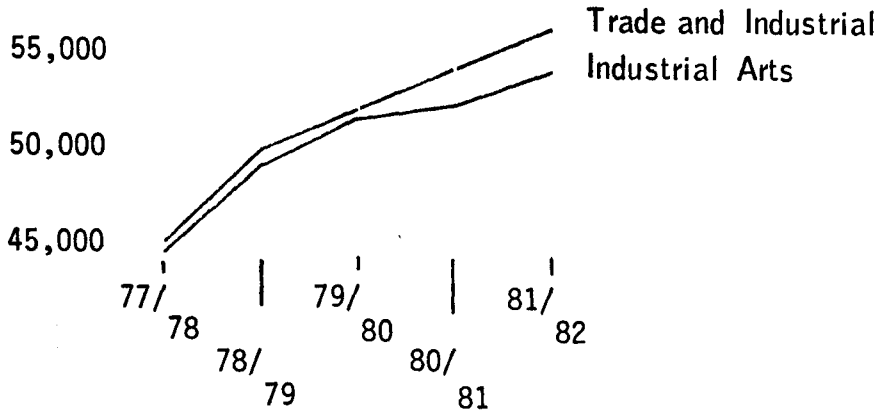

Figure 5: Projection of enrollment in Virginia secondary schools.

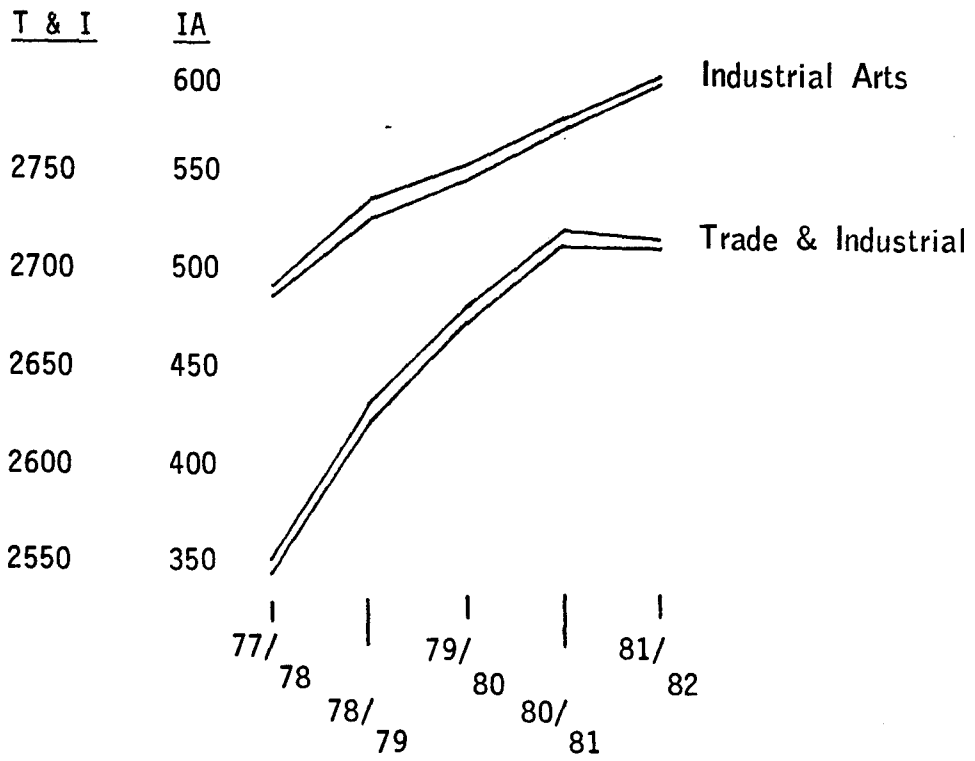

Figure 6: Projection of demand for vocational education teachers in Virginia secondary schools.

Figure 6. A spokesman for the Industrial Arts Education Service reported in March 1978 that a total of 26 vacancies existed for industrial arts teachers in the State of Virginia. He explained this number of vacancies as partly the result of a failure of the institutions to achieve 100 percent of their planned number of graduating students.

Sub-strategy 12.2 of that plan states that each service having teacher shortages will develop appropriate recruitment materials and explore the possibility of expanding teacher education programs. These tasks extend through 1980. The Industrial Arts Education Service in their plan has indicated that a recruitment brochure has been funded and will be disseminated by 1978.

In Table 8B of the vocational education plan, entitled "Projection of State's Enrollment in Vocational Education Personnel Preparation and Development", the new teacher output of the state's teacher education institutions is shown. The continued growth in this pattern is indicated in the line graphs presented herein in Figure 7.

Based on the tasks as outlined in the plan for vocational education the Industrial Arts Education Service included in their plan for the same period a series of objectives to meet the needed growth in industrial arts programs. Among these objectives is that 80 percent of the secondary school systems will have courses in industrial arts. 90 percent of the students in these systems will have access to these courses which assist them in making informed occupational and educational choices. A further objective is that by 1980 an adequate supply of certified industrial arts teachers will be available throughout the state. This supply will be met by the output of the teacher education institutions within the

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s		
e	1500	425
r	1400	400
v	1300	375
i	1200	350
c	1100	325
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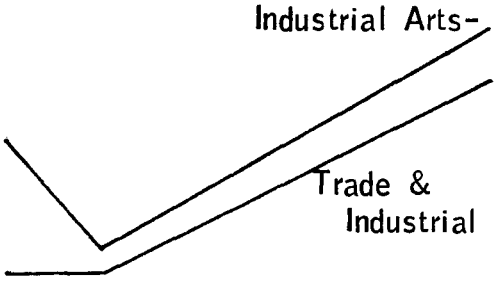

	T & I	IA
PRE		125
s	65	120
e	60	115
r	55	110
v	50	
i	45	
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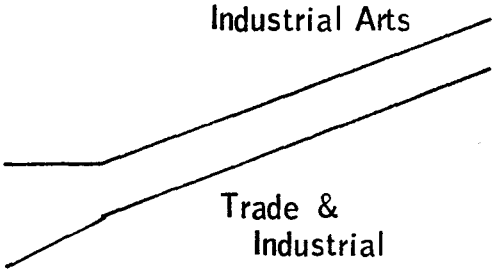

Figure 7: Projections of enrollment in Virginia teacher education institutions.

state and augmented by recruiting of teachers from outside the state.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

INTRODUCTION

This study sought to identify certain information concerning students enrolled in courses offered by the Industrial Arts Department at Old Dominion University with the intent to establish a data base to assist in long range planning. This chapter attempts to summarize the procedures used in the study, draw conclusions about the findings of the study, and assess the implications for further research.

SUMMARY

This study sought to identify FTE enrollment in the courses offered by the industrial arts department and to formulate a projection of enrollment for the future. Three questions further delineated the problem and provided more specific direction for the study. These research questions set forth in Chapter 1 were:

1. What has been the enrollment in industrial arts at Old Dominion University during the past 10 years?

2. What enrollment figures can be expected in industrial arts at Old Dominion University during the next 5 year period?

3. Can changes in FTE enrollment be attributed to scheduling and course offerings?

The study collected data and information from offices throughout the university. This data was analyzed for relevance, completeness, accuracy, and

content. Fall FTE enrollment data was derived from total student credit hours and course tallies available from computer programs established by the Office of Institutional Studies. Line graphs were prepared to graphically display FTE enrollment. Growth curves were determined where possible and projected to provide probable future enrollment data. These curves were compared to related enrollment data and projections provided in state planning documents and other research literature. Deviations in the curves were analyzed for impact and probable cause. Course offerings and schedules were analyzed to determine possible correlation with significant changes in enrollment. In addition, data was gathered to determine the number of students enrolled in the industrial arts program in order to establish a capacity and operating level of the program and the service courses offered by the department.

CONCLUSIONS

Based upon the data found available for this study and the findings of this study and the appropriateness of the methods used in the analyzation, several conclusions can be drawn. These conclusions can be categorized as follows: (1) the definition of data, (2) the recording and storage of data, (3) the interpretation of data, (4) the use of data, (5) scheduling practices, and (6) factors affecting the program.

Definition of Data.

Various offices throughout the university collect data on course tallies and FTE enrollment. Although gathering data under a common heading, these offices have often arrived at a different total. Computer printouts of course

tallies have shown graduate enrollment in undergraduate courses. These errors can be attributed to the mis-use of registration forms and possibly to the input of the computer. The totals for lower and upper level enrollment depends on whether the collection method uses course numbers or student status as the separating factor. FTE enrollment concerns only on-campus courses. Accordingly, a common definition of all factors used in FTE enrollment computations should be agreed upon and disseminated as appropriate. This would ensure that all departments and offices making decisions based on FTE enrollment will be operating from the same data base.

Recording and Storage of Data.

Enrollment data and other information used by the departments in planning has not been provided on a routine basis from higher offices within the university. Departments have operated from data gathered separately and subject to their interpretation. This data has not always found its way to department files. The Office of Institutional Studies has started a new program of data collection and is disseminating the information to the schools and to the departments. Timely distribution of this data is necessary as is the acceptance by departments. Use of this common data base information will enhance the accuracy of planning. Departments must have the capability to maintain historical planning data in order to maintain continuity and program surveillance.

Interpretation of Data.

Small changes become highly visible in small programs. The use of percentage changes are subject to misinterpretation in that a change of a very small number can compute to a large percentage. The move of a single course

from off-campus to on-campus has caused a dramatic change in FTE enrollment. The results of studies applied to the national scene should not be applied in its strictest sense to a local situation. A widely distributed national study indicated an overproduction and an excess of industrial arts teachers (National Education Association, 1977). State supervisors reported to the Southeast Conference of the American Industrial Arts Association, 1977, that there were a total of 350 teacher vacancies in industrial arts in the southeast region of states. The State of Virginia now has 26 vacancies. The State of Virginia plans to recruit industrial arts teachers from out of state to fill vacancies through the planning period to 1982. These recruited teachers must come from outside the southeast region, a monumental and costly move for any secondary school teacher. Accordingly, it should not be interpreted that the supply of industrial arts teachers exceeds the demand or that this situation will change dramatically with the next 5 year period.

Use of Data.

FTE enrollment data is used in the planning of personnel, facilities, and budget requirements. In a technical program area, such as industrial arts, the maintainence of a up-to-date and accountable curriculum requires planned, systematic changes in facility, tools, and equipment. Accordingly, a reliable data base for planning is an important factor in maintaining the effectiveness and efficiency of the industrial arts program.

Scheduling Practices.

The industrial arts curriculum provides 30 hours of laboratory experience required for certification. Several factors affect the scheduling of industrial arts

courses. Laboratory courses require 6 student contact hours per week. Attention must be given to scheduling of the laboratories to prevent overlap and interference. The faculty is small and teaching overloads have been common practice for all faculty members. Many of the students transfer into the program needing only industrial arts courses to complete graduation requirements. The small faculty and the facility operate best with regular scheduling of designated fall and spring courses. The courses that have been regularly scheduled have produced consistent and dependable enrollments. However, courses other than those planned for that semester must be included in the schedule in order to meet the needs of the typical industrial arts student. This practice, through required, often results in a low enrollment and occasionally the cancellation of the class due to lack of enrollment. The summer schedule is derived for this same purpose and is beset with the same problems of enrollments. Service courses offered as electives have produced consistent enrollments. The facility is capable of supporting additional courses of this kind. Part time instructors would need to be employed for this effort. FTE enrollment is enhanced when courses are conducted on-campus and scheduled to produce maximum enrollment.

Factors Affecting the Program.

The industrial arts curriculum supports certification requirements of the state and graduation requirements of the university and the School of Education. The curriculum is full. There is no room for electives. Elective type courses are designed and offered to upgrade the tool skills of industrial arts majors and to serve as electives for students from other disciplines on campus. A significant number of students in the industrial arts program have

transferred from other disciplines or institutions and their scheduling needs are different than those of the traditional four-year student. There remains a shortage of industrial arts teachers in Virginia and projected demand shows continuing growth through the period to 1982. Active recruiting of students as potential industrial arts teachers is necessary in order to fill current vacancies and meet the projected demand. The success of a recruiting effort would be reflected in FTE enrollment.

IMPLICATIONS AND RECOMMENDATIONS

This section is presented in three parts. A part is devoted to each of the research questions presented in Chapter 1.

What has been the enrollment in industrial arts at Old Dominion University during the past 10 years?

Enrollment data has been recorded over the past 10 years and is graphically displayed in Figure 1. Although minor discrepancies can be found in the records, they are not of significant value. However, effort must continue to perfect the data collection procedures and to disseminate the information, with adequate definition, to the department level.

Records should be maintained to show the numbers of students enrolled in the industrial arts program as degree candidates and as special students for certification only. In addition, records should be maintained showing the numbers of students enrolled in elective type courses.

Enrollment numbers, names, and discipline should be maintained to assist in the analyzation of the status and success of the program and its individual courses.

What enrollment figures can be expected in industrial arts at Old Dominion University during the next 5 year period?

No formula was found with which to predict enrollment in higher education in any particular discipline. Many factors have been identified which effect enrollment at the higher education level (Smeaton and Wagner, 1976). One factor is advertising and recruiting. Active recruitment of industrial arts teachers is included in the plans of offices at the state level. In order to fulfil its part in the supply of industrial arts teachers in Virginia, Old Dominion University should actively recruit students for enrollment in the industrial arts program. The success of this recruitment would be reflected in increased FTE enrollment.

Can changes in enrollment be attributed to scheduling and course offerings?

Fall FTE enrollment is a major factor in support of programs and institutions. Courses that have enjoyed a regular scheduling practice have produced consistent enrollments. Many courses have been scheduled in a more flexible manner to meet the needs of the students. The flexibly scheduled courses have not been consistent enrollment producers. The industrial arts curriculum does intend regular offering of certain courses in the fall and others in the spring. Close attention should be given to regularly schedule those courses intended as fall offerings and to withhold scheduling basic courses in this category during the summer sessions.

LIST OF REFERENCES

Ary, Donald, Lucy Cheser Jacobs, and Asghar Razavieh. Introduction to Research in Education. New York: Holt, Rinehart and Winston, 1972.

Campbell, William G. and Stephen V. Ballou. Form and Style: Thesis, Reports, Term Papers, Boston: Houghton Mifflin, 1972.

Department of Industrial Arts Education, Annual and Long-Range Improvement Plan, 1977-82, Old Dominion University, Norfolk, 1977.

Division of Educational Research and Statistics, State Department of Education, Commonwealth of Virginia, Projection of Enrollment in Virginia Public Schools, Richmond, 1972.

Industrial Arts Education Service, Division of Vocational Education, State Department of Education, Commonwealth of Virginia, Annual and Long-Range Improvement Plan, 1977-82, Richmond, 1977.

National Center for Educational Statistics, Projections of Educational Statistics to 1985-86, U.S. Department of Health, Education, and Welfare, Office of Education, Washington: U.S. Government Printing Office, NCES 77-402, 1977.

National Education Association, Teacher Supply and Demand in Public Schools, 1976, NEA Research Memo 1977-3, Washington, 1977.

National School Public Relations Association, Declining Enrollment: Current Trends in School Policies and Programs, U.S. Educational Resources Information Center, ERIC Document ED 130 450, 1975.

Smeaton, Jane and Wagner, David. Barriers to Enrollment in Post Secondary Vocational Technical Adult Education Programs in Wisconsin. U.S., Educational Resources Information Center, ERIC Document ED 135 445, June, 1976.

State Board of Vocational Education, Commonwealth of Virginia, The State Plan for Vocational Education, 1978-82. Richmond, 1977.

State Council for Higher Education, Commonwealth of Virginia, The Virginia Plan for Higher Education, Richmond, 1974.

Suter, Larry E. Projection of School and College Enrollment, 1971-2000, U.S., Educational Resources Information Center, ERIC Document ED 128 905, January 1972.