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AUTHOR Dellinger, Richard N., Jr.
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ABSTRACT

Industrial arts programs in Pennsylvania public schools are distributed throughout all levels. Senior high programs are present in 96 percent of the school districts; junior high, 86 percent; adult classes, 22 percent; middle schools, 15 percent; and elementary schools, 2 percent. Instruction is offered in industrial materials (wood, metals, and plastic ranking as the top three), power, and visual communications (drafting offered most frequently, followed by graphic arts). Class size usually is in the 11-16 student range or the 17-21 student range. 1970-71 enrollment of girls in the programs was about 5 percent, but that is expected to change. Overhead projectors are the most frequently-used supporting instructional device. A consensus prevails that industrial arts relates more closely to math and science and fine arts than to any other disciplines. Career information and information pertaining to local industry is most often conveyed through regular classes. An increase in the need for additional industrial arts teachers was estimated, and the areas of greatest need were specified. Six specific industrial art objectives are itemized in the report with an indication of priority rating for each grade level. (AG)

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# A Survey Of Industrial Arts In Pennsylvania

Prepared by
Richard N. Dellinger, Jr.
Student Intern
Division of Science and Technology
Bureau of Curriculum Services
Pennsylvania Department of Education
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Pennsylvania Department of Education
Box 911
Harrisburg, Pa. 17126

## Distribution of Programs

Industrial arts has traditionally been directed toward junior and senior high school students. However, current programs are potentially valuable to students in elementary schools. Figure 1 reveals that two per cent of the school districts in Pennsylvania have initiated programs geared toward the elementary pupil. These are recent curriculum developments and reflect only a part of the total continuum in industrial arts education.

FIGURE 1 PER CENT OF SCHOOL DISTRICTS HAVING INDUSTRIAL ARTS PROGRAMS AT VARIOUS GRADE LEVELS: PA., 1971-72

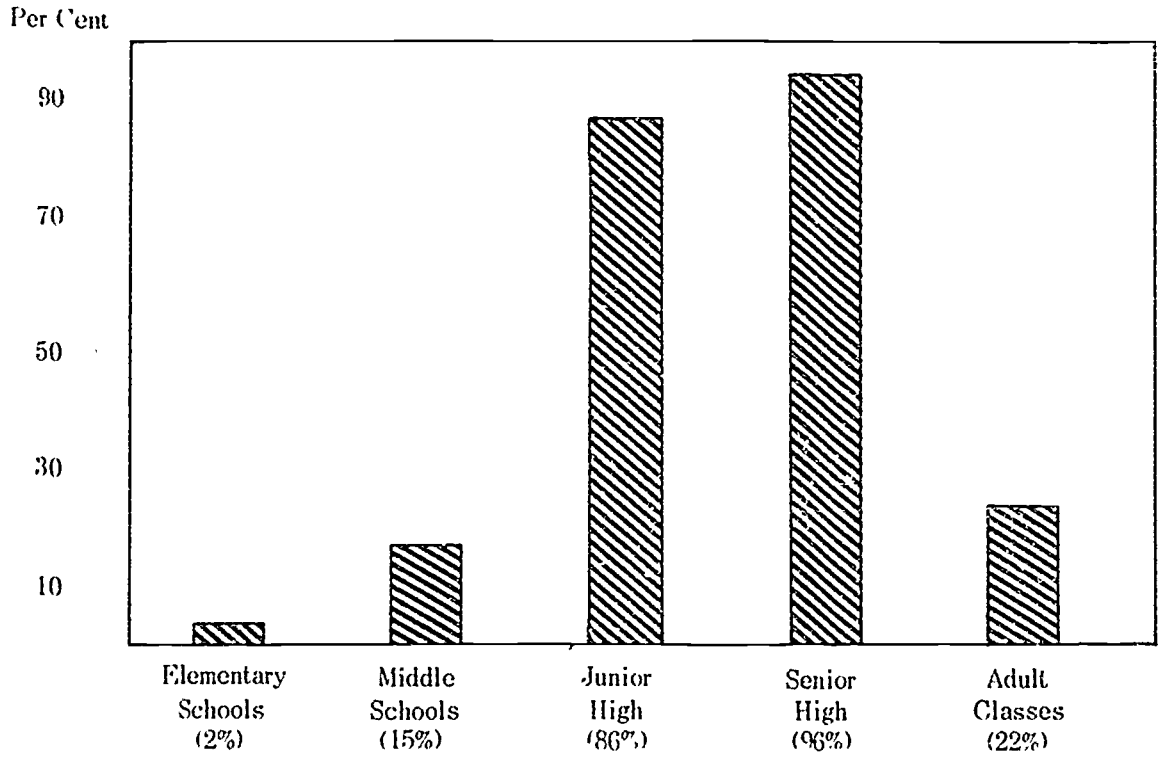



Table A lists intermediate units and the per cent of school districts within each having industrial arts programs at the various levels.

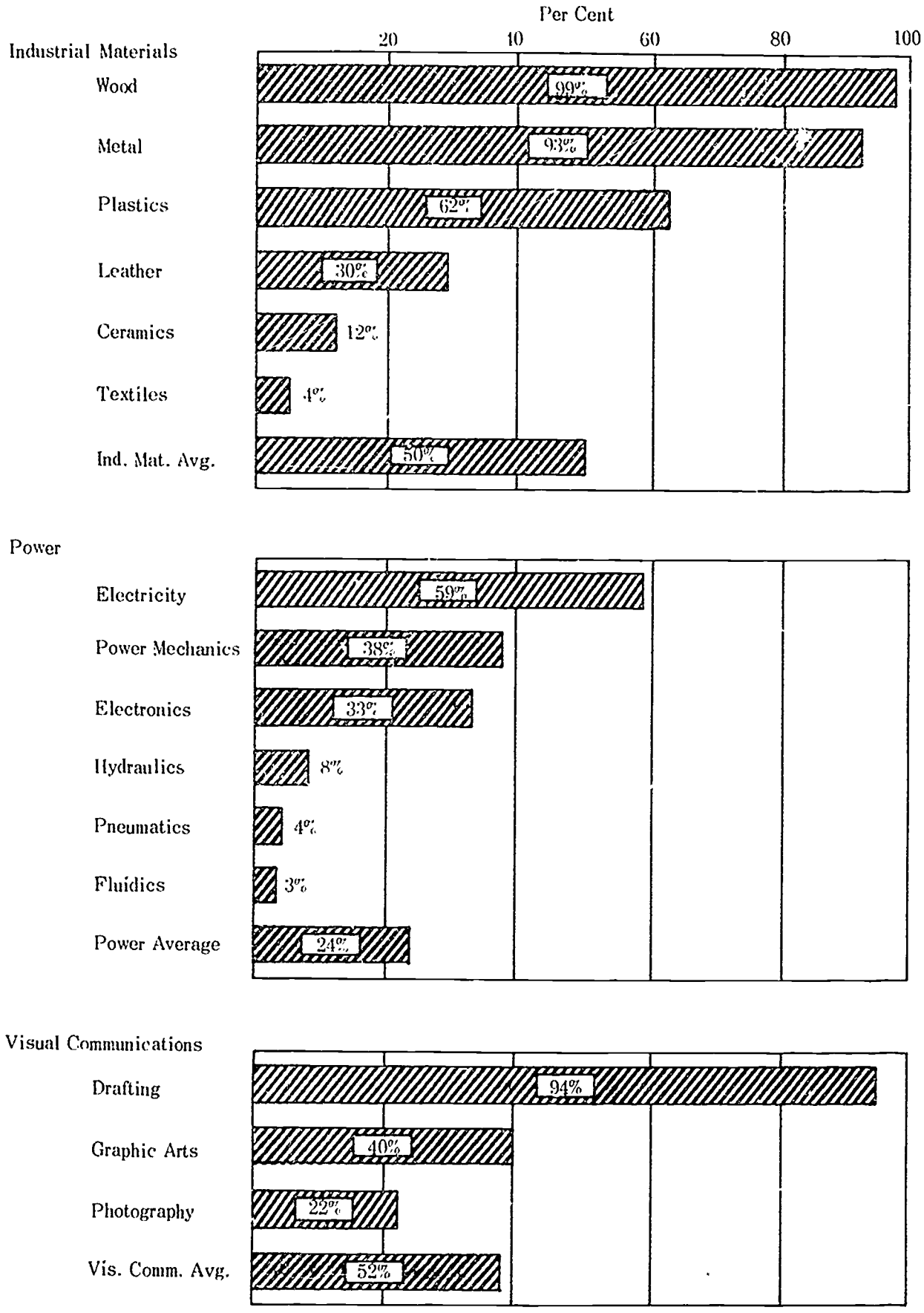
TABLE A PER CENT OF SCHOOL DISTRICTS IN EACH INTERMEDIATE UNIT HAVING INDUSTRIAL ARTS PROGRAMS AT VARIOUS EDUCATION LEVELS: PA., 1971-72

| IU No. | INTERMEDIATE UNIT | Elementary | Middle School | Junior High | Senior High | Adult Classes |
|---|---|---|---|---|---|---|
| 1. | Intermediate Unit I | .... | 16% | 88% | 100% | 16% |
| 2. | Pittsburgh-Mt. Oliver IU | .... | 100% | 100% | 100% | .... |
| 3. | Allegheny IU | 2% | 28% | 80% | 100% | .... |
| 4. | Midwestern IU | .... | 7% | 92% | 96% | 25% |
| 5. | Northwest Tri-County IU | .... | 18% | 87% | 100% | 31% |
| 6. | Clarion Mano IU | 5% | 5% | 94% | 100% | 11% |
| 7. | Westmoreland IU | .... | .... | 100% | 100% | 35% |
| 8. | Appalachia IU | .... | 2% | 94% | 97% | 8% |
| 9. | Seneca Highlands IU | .... | 7% | 92% | 85% | 21% |
| 10. | Central IU | .... | 8% | 91% | 91% | 16% |
| 11. | Tuscarora IU | .... | 11% | 88% | 77% | 11% |
| 12. | Lincoln IU | .... | 16% | 84% | 100% | 8% |
| 13. | Lancaster-Lebanon | .... | 27% | 72% | 100% | 50% |
| 14. | Berks County IU | 1% | 11% | 77% | 94% | 22% |
| 15. | Capital Area IU | .... | 16% | 83% | 100% | 29% |
| 16. | Central Susquehanna IU | .... | 23% | 76% | 82% | 5% |
| 17. | Blast IU | 5% | 10% | 18% | 100% | 10% |
| 18. | Luzerne IU | .... | 16% | 91% | 100% | 16% |
| 19. | Northeastern IU | .... | 5% | 95% | 90% | 15% |
| 20. | Colonial Northampton IU | 7% | 7% | 92% | 100% | 30% |
| 21. | Carbon-Lehigh IU | .... | 28% | 71% | 92% | 21% |
| 22. | Bucks County IU | 7% | 30% | 76% | 100% | 46% |

TABLE A (continued)

| IU No. | INTERMEDIATE UNIT | Elementary | Middle School | Junior High | Senior High | Adult Classes |
|---|---|---|---|---|---|---|
| 23. | Montgomery County IU | .... | 9% | 90% | 95% | 33% |
| 24. | Chester County IU | .... | 41% | 66% | 100% | 16% |
| 25. | Deleware County | .... | 19% | 80% | 85% | 19% |
| 26. | Philadelphia IU | 62% | 50% | 100% | 100% | 25% |
| 27. | Beaver Valley IU | 6% | 6% | 93% | 100% | 13% |
| 28. | Arin IU | .... | .... | 100% | 100% | 36% |
| 29. | Schuylkill IU | .... | 33% | 66% | 83% | 8% |

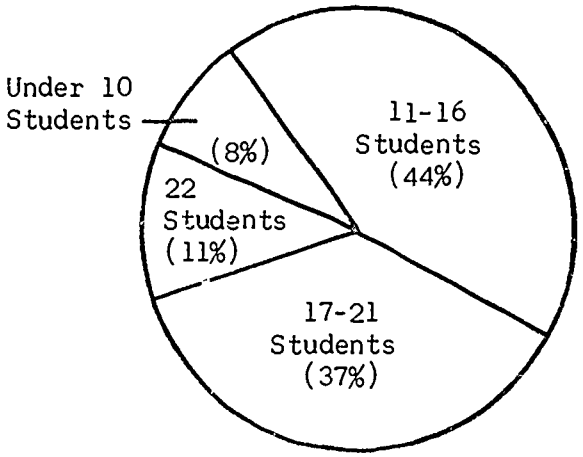
FIGURE 2 THE PER CENT OF SCHOOL DISTRICTS THAT OFFER INSTRUCTION IN VARIOUS AREAS OF INDUSTRIAL ARTS: PA., 1971-72



## Class Size

The 21,026 industrial arts classes reported from the 1970-71 school year were categorized according to size. Figure 3 shows that there were approximately the same number of classes with 11 - 16 students as the number of classes with an enrollment of 17 - 21 students. Small classroom situations under 10 students formed the smallest per cent of the total while 11 per cent exceeded the recommended class size of 20 students.

FIGURE 3 TOTAL NUMBER OF INDUSTRIAL ARTS CLASSES IN 1970-71 BY REPORTED CLASS SIZE: PA, 1971-72




## Enrollment Statistics

Figure 4 is a comparison of boy and girl enrollments for 1970-71 and table B shows what per cent of the total state enrollment each grade formed. Statistics from 1970-71 indicate that the total number of girls involved in industrial arts programs was 5 per cent. However, as women are encouraged to enter the fields of business and industry in greater numbers, future industrial arts enrollments will certainly be affected.

FIGURE 4 A COMPARISON OF THE 1970-71 INDUSTRIAL ARTS ENROLLMENTS AT VARIOUS GRADE LEVELS: PA., 1971-72

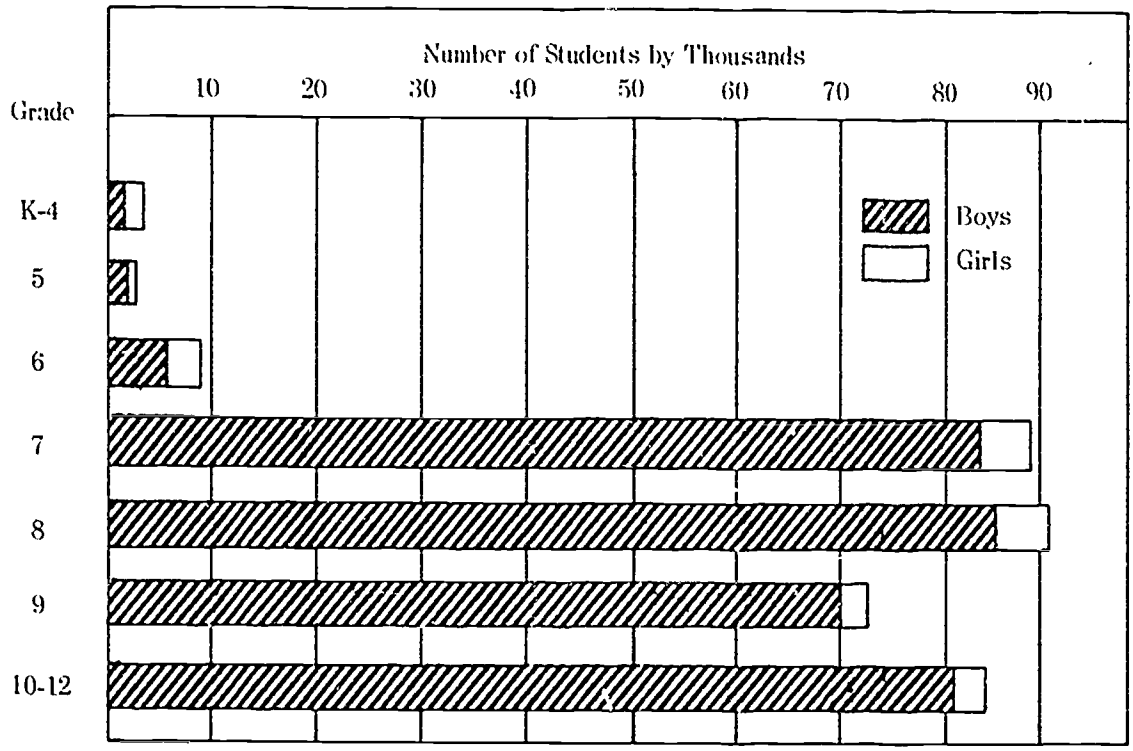



TABLE B TOTAL INDUSTRIAL ARTS ENROLLMENT STATISTICS FOR THE 1970-71 SCHOOL YEAR: PA., 1971-72

| Grade | Number of Boys | Number of Girls | Combined Students | Per Cent of Total Enrollment |
|---|---|---|---|---|
| K-4 | 1,526 | 1,076 | 2,602 | 0.7 |
| 5 | 1,592 | 420 | 2,012 | 0.6 |
| 6 | 6,873 | 2,253 | 9,126 | 2.6 |
| 7 | 84,529 | 4,747 | 89,276 | 25.3 |
| 8 | 86,856 | 4,289 | 91,145 | 25.9 |
| 9 | 71,225 | 2,042 | 73,267 | 20.8 |
| 10-12 | 81,839 | 3,305 | 85,144 | 24.1 |
| State Totals | 334,440 | 18,132 | 352;572 | 100.0 |

## Teaching Methods

Table C, lists several devices for presenting instructional materials. These are listed according to frequency of use.

Figure 5 deals with research and experiementation techniques employed in the classroom.

Closely related to these techniques is the amount of flexibility found in classes for advanced or independent study. A summary of the kind of study provided is presented in figure 6. In all cases, the results indicate that approaches used in the classroom are determined by teacher-student selection.

TABLE C SUPPORTING INSTRUCTIONAL DEVICES USED IN INDUSTRIAL ARTS DEPARTMENTS: PA., 1971-72

| Substantial or Some Degree | DEVICE USED | No Degree |
|---|---|---|
| 93% | Overhead Projector | 7% |
| 46% | Single Concept Loop Films | 53% |
| 42% | Programed Instruction | 56% |
| 29% | Video Tape Recorder | 70% |

FIGURE 5 USE OF RESEARCH AND EXPERIMENTATION TECHNIQUES IN TEACHING INDUSTRIAL ARTS: PA., 1971-72

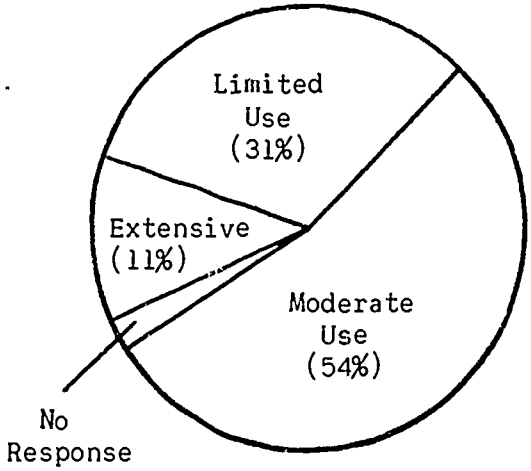
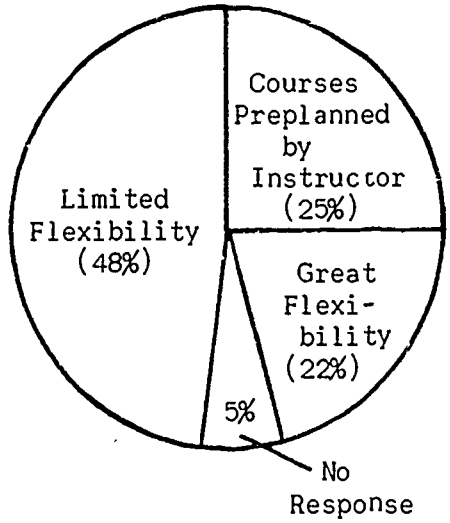


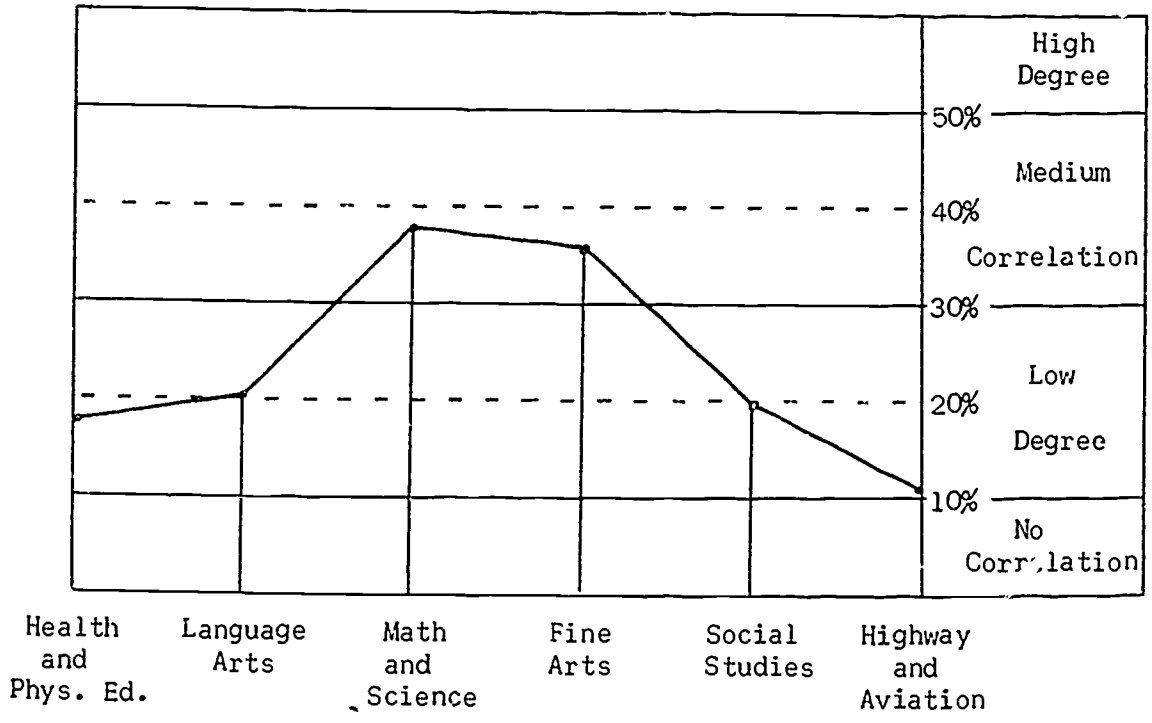

FIGURE 6 OPPORTUNITY FOR SPECIAL INTREST OR INDEPENDENT STUDENT STUDY: PA., 1971-72



Relating Industrial Arts to Other Disciplines

Presented in figure 7 are the results of responses to a question about the correlation between industrial arts and other subjects. The consensus is that industrial arts relates the closest to math and science (average 37 per cent) and fine arts (average 36 per cent).

FIGURE 7 CORRELATION BETWEEN INDUSTRIAL ARTS CLASSES AND OTHER SUBJECTS: PA., 1971-72



## CAREER INFORMATION AND LOCAL INDUSTRY

Each school district supplied information concerning the procedures most frequently used in providing career information and introducing industrial organization to students. The methods used in presenting career information are listed in table D. The techniques used to present organization and management phases of industry are given in table E. Both tables include the extent to which each method was used and lists the methods in the order of their use.

TABLE D METHODS USED IN PRESENTING CAREER INFORMATION: PA., 1971-72

| Rank | METHOD | Method Utilization | | | No Response |
|---|---|---|---|---|---|
| | | Substantial | Some Degree | Little or None | |
| 1 | Regular Classes | 31.8 | 64.5 | 2.9 | 0.8 |
| 2 | Presentation Through Audio-Visual Media | 20.6 | 65.8 | 12.6 | 0.9 |
| 3 | Guidance Personnel | 11.8 | 50.9 | 35.0 | 2.3 |
| 4 | Local Industry | 2.7 | 35.9 | 59.2 | 2.1 |

TABLE E TECHNIQUES USED TO PRESENT ORGANIZATION AND MANAGEMENT PHASES OF INDUSTRY: PA., 1971-72

| Rank | TECHNIQUE USED | Degree Used | | | No Response |
|---|---|---|---|---|---|
| | | Maximum | Some | None | |
| 1 | Teacher - led Discussions | 45.4 | 52.4 | 1.5 | 0.6 |
| 2 | Simulation (hazard rules, time factor, salability factor) | 19.6 | 62.7 | 16.7 | 1.0 |
| 3 | Class Organization Parallels Industry's | 14.4 | 73.8 | 11.3 | 0.6 |
| 4 | Line Production, Job Specialization | 6.2 | 71.1 | 21.9 | 0.8 |
| 5 | Field Trips | 1.6 | 60.4 | 37.3 | 0.8 |
| 6 | Business and Industry Resource Personnel Brought In | 0.6 | 53.0 | 44.7 | 1.7 |

The number of times resource people are involved in the industrial arts classroom is shown in figure 8. Figure 9 represents how often trips are taken to observe local industry. Use of resource personnel and visits to local businesses provide students with firsthand career information and a better understanding of the function and organization of business.

FIGURE 8 INVOLVEMENT OF RESOURCE PERSONNEL IN CLASSROOM ACTIVITIES: PA., 1971-72

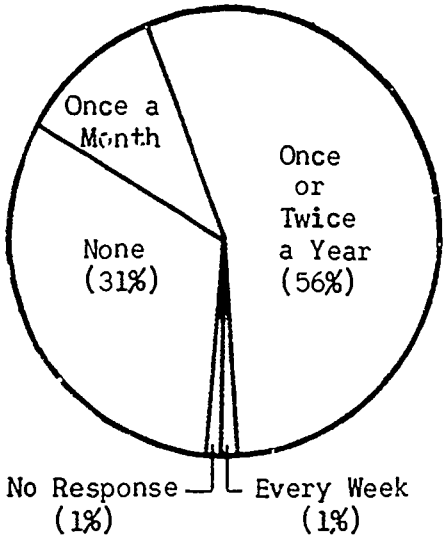
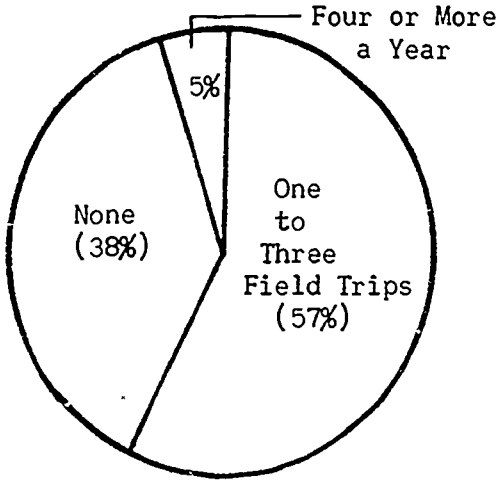



FIGURE 9 NUMBER OF TRIPS TO LOCAL BUSINESSES OR INDUSTRY: PA., 1971-72



## ADDITIONAL TEACHERS FOR INDUSTRIAL ARTS

Industrial arts enrollments continue to increase in comparison to the total public school enrollments. Demand for additional teachers is also increasing. In the survey, each school district was asked to estimate the number of additional teachers needed by the 1975-76 school year. The results indicated an additional 776 industrial arts teachers will be needed, this increase consists of 55 per cent secondary teachers, 30 per cent middle school teachers and 15 per cent elementary teachers. The anticipated need is presented in figure 10.

FIGURE 10 ANTICIPATED TEACHER NEED IN INDUSTRIAL ARTS FOR THE 1975-76 SCHOOL YEAR: PA., 1971-72

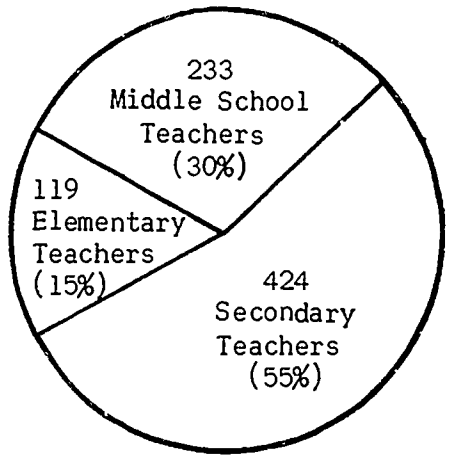
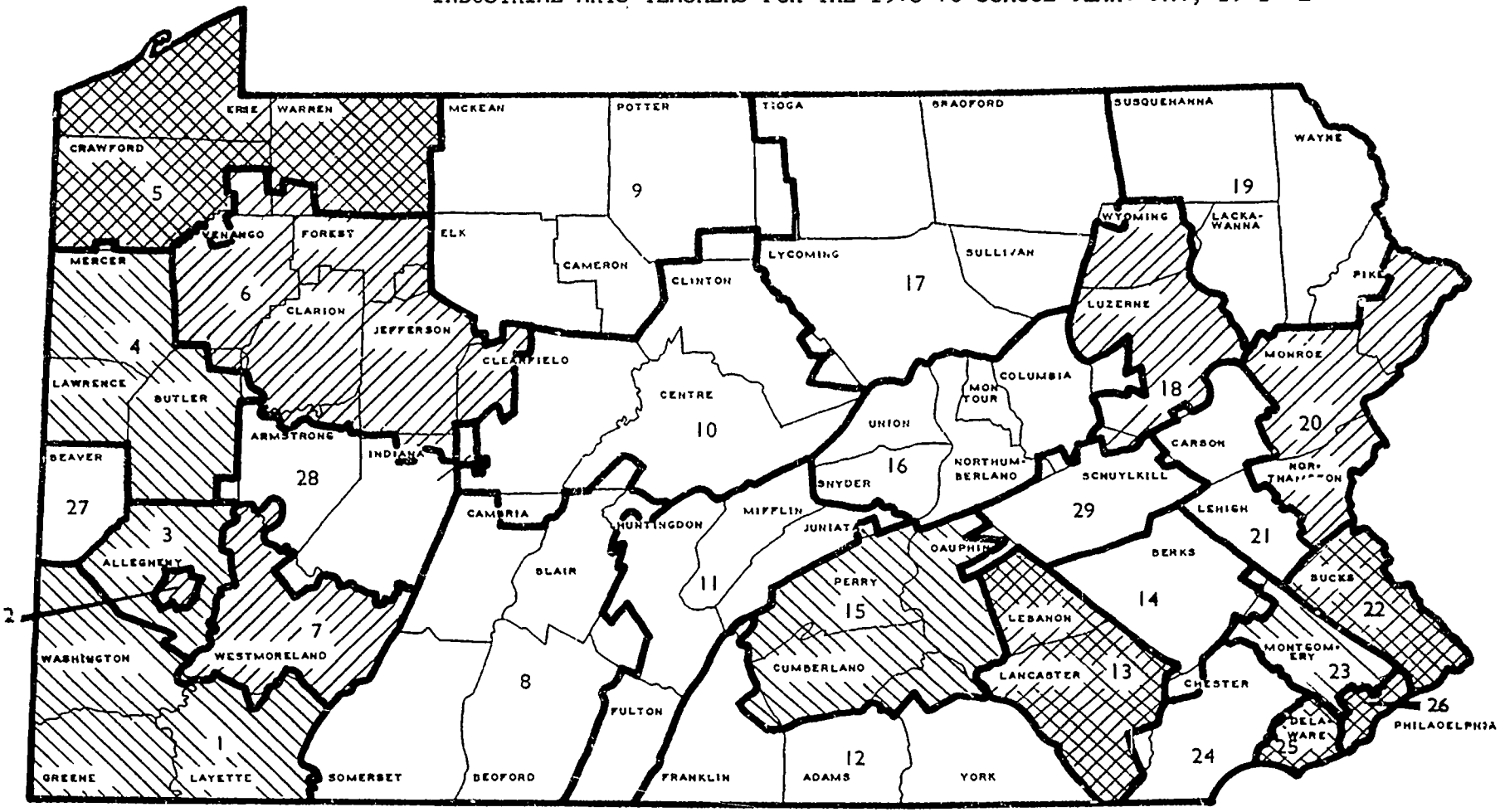



Figure 11 indicates the areas in Pennsylvania where the demand for industrial arts teachers is greatest. The 10 intermediate units projecting the greatest total need and the 10 intermediate units projecting the greatest need for elementary industrial arts teachers only are shaded in the figure. The name of each intermediate unit and its corresponding number is listed in table G.

FIGURE 11 INTERMEDIATE UNITS PROJECTING THE GREATEST ADDITIONAL NEED FOR INDUSTRIAL ARTS TEACHERS FOR THE 1975-76 SCHOOL YEAR: PA., 1971-72




Ten Intermediate Units Projecting the Greatest Total Need for Industrial Arts Teachers

Ten Intermediate Units Expecting the Greatest Need for Elementary Industrial Arts Teachers

TABLE G THE NAMES AND CORRESPONDING NUMBERS OF THE TWENTY-NINE INTERMEDIATE UNITS IN PENNSYLVANIA

| IU Number | INTERMEDIATE UNIT | IU Number | INTERMEDIATE UNIT |
|---|---|---|---|
| 1. | Intermediate Unit I | 16. | Central Susquehanna IU |
| 2. | Pittsburgh-Mt. Cliver IU | 17. | Blast IU |
| 3. | Allegheny IU | 18. | Luzerne IU |
| 4. | Midwestern IU | 19. | Northeastern Educational IU |
| 5. | Northwest Tri-County IU | 20. | Colonial Northampton IU |
| 6. | Clarion Manor IU | 21. | Carbon-Lehigh IU |
| 7. | Westmoreland IU | 22. | Bucks County IU |
| 8. | Applachia IU | 23. | Montgomery County IU |
| 9. | Seneca Highlands IU | 24. | Chester County IU |
| 10. | Central IU | 25. | Deleware County IU |
| 11. | Tuscarora IU | 26. | Philadelphia IU |
| 12. | Lincoln IU | 27. | Beaver Valley IU |
| 13. | Lancaster-Lebanon IU | 28. | Arin IU |
| 14. | Berks County IU | 29. | Schuylkill IU |
| 15. | Capital Area IU | | |

## Educational Objectives in Industrial Arts

Table F shows six specific objectives that apply to industrial arts education. These objectives were ordered consecutively, one through six, based on the school district's rating of the importance of an objective at three separate grade levels. An objective numbered one indicates a high priority while, for the same grade level, a less important objective is numbered six.

## Piaget's Theory and Industrial Arts

The industrial arts survey contained several statements which ask for individual opinions--agree, disagree, or undecided.

Responses to statements concerning educational psychology and its applications in teaching industrial arts were undecided. Forty-eight per cent of the persons responding indicated they were unfamiliar with Piaget's theory of childhood learning and how well it relates to promoting industrial arts at the elementary level.

Jean Piaget, a contemporary Swiss psychologist, identified four main steps in the development of a child's mental structure. The third stage, "Concrete Operations Stage," is important because most children in elementary school are at this level of development. Working at simple constructions with clay, wood, plastic, etc., is beneficial to a child's development in this "concrete stage."

TABLE F SIX SPECIFIC INDUSTRIAL ARTS OBJECTIVES AND THE AVERAGED PRIORITY RATING FOR EACH AT THREE SEPARATE GRADE LEVELS: PA., 1971-72

| EDUCATIONAL OBJECTIVE | Averaged Priority Rating for Each Grade Level | | |
|---|---|---|---|
| | K-5 | 6-8 | 9-12 |
| a. Inculcate awareness of safe and unsafe uses of tools and machines. | 1 | 1 | 1 |
| b. Increase problem-solving ability and foster creativeness through student involvement in applied research, experimentation, design and follow-up. | 2 | 2 | 3 |
| c. Discover and develop specific student interests and talents as a forerunner to adult careers and hobbies. | 3 | 3 | 4 |
| d. Foster an understanding of the place of industry in society, primarily through comprehensive academic studies. | 4 | 6 | 6 |
| e. Foster an understanding of the place of industry in society, primarily through acquiring skills and experiencing applications. | 5 | 4 | 2 |
| f. Teach reading and writing in the specialized languages of industry, science and technology, drafting, sketching, blueprints, circuitry, flow diagrams, equations, etc. | 6 | 5 | 5 |

## CONCLUSION

The industrial arts curriculum has undergone great expansion during the past several years. This report indicates a wide variety of topics in modern programs which reflect the advances in technology. Guidelines have also been developed for programs in primary grades. Although only 2 per cent of the state's school districts had elementary programs in 1970-71, there were 179 school districts that anticipated a program within the next 10 years.

Expanding programs have increased the demand for elementary and secondary teachers of industrial arts. Areas in Pennsylvania where the greatest demand is expected are included in this report. Anticipated increases reflect not only program development, but also increasing student enrollments.

Specific educational objectives can often be incorporated into current programs and used as guidelines for the improvement of industrial arts education. Sample objectives are in the report and are ranked according to the importance which school districts attached to each. Because these objectives are often based on educational psychology, a better understanding of learning processes and theories, such as Piaget's, is necessary.

The report's statistics indicate that local business and industries were not being incorporated into the industrial arts curriculums. Interrelating these resources with classwork will give students the opportunity to observe local applications of technology. It will also help students understand their role in this industrial and technological culture.