

1989

## Employment needs of the graphic arts industry in Iowa as perceived by Iowa graphic arts manufacturers and Iowa graphic arts educators

John Frank Gindele  
*University of Northern Iowa*

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Gindele, John Frank, D.I.T.  
University of Northern Iowa, 1989

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EMPLOYMENT NEEDS OF THE GRAPHIC ARTS INDUSTRY IN IOWA  
AS PERCEIVED BY IOWA GRAPHIC ARTS MANUFACTURERS  
AND IOWA GRAPHIC ARTS EDUCATORS


A Dissertation  
Submitted  
In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Industrial Technology

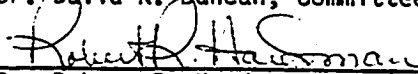
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1989

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### Major Findings

Significantly different means were found between the responses of manufacturers and educators in nine of 35 production areas plus one of three management areas pertaining to the current demand; 11 of 35 production areas plus one of three management areas pertaining to the future demand. Significant differences were found in the compared perceptions among manufacturers and among educators of current demand and future demand in 27 of 35 production areas, all three management areas; and six of 26 issue statements.

Manufacturers reported a current demand for 2322 skilled workers, 313 management personnel, and 290 sales personnel. The future demand is 3648, 468, and 459, respectively. These numbers only represent the probable demand stated by the manufacturers. Shortages of skilled production workers do exist. Half of the manufacturers employ fewer than 10 people and 15% of the educators are approaching retirement. Also, educators should emphasize job opportunities for sales and management personnel.

One-third of sampled educators reported a decrease in enrollment; 26% reported an increase. High school teachers receive little or no support from guidance counselors. The respondents want industrial personnel to (a) offer free training to educators, (b) offer internships to students/educators, and (c) set aside funds for updating equipment for graphic arts programs.



DEDICATION

This research is dedicated to  
my loving parents  
Mary Cadova Gindele, and  
Otto Gindele, Sr.

and to

Duane A. Bingham, educator, mentor  
and best friend

## ACKNOWLEDGEMENTS

A significant amount of gratitude and appreciation needs to be bestowed upon those individuals who contributed to the successful completion of this study. Without the cooperation and guidance of the following people this study would not have been possible:

Dr. Ervin A. Dennis (major advisor and chair of the doctoral committee) has assisted me in every aspect of the dissertation process. I am deeply appreciative of his helpful suggestions, patience, and encouragement throughout the years.

Dr. Charles D. Johnson (co-advisor), Dr. Ronald D. Bro, Dr. David R. Duncan, and Dr. Robert R. Hardman, professors and committee advisors, have provided direction and support and encouragement throughout my doctoral program. I thank all five committee members for giving of themselves and adjusting the time in their busy schedules to help with solutions when I encountered problems.

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Mr. James R. Frey, President of the Printing Industries of the Midlands, has provided moral and financial support towards postage for mailing the opinionnaires. Mr. Richard Congdon, President of Congdon Printing Company, donated typesetting, prepress, paper and printing services which served as an important contribution to this study.

Other individuals were important to the study. These people are all of the Iowa graphic arts manufacturers and educators; the jury members; members of the Des Moines, Iowa City, Omaha, and Waterloo Clubs

of Printing House Craftsmen; Dr. Virgil R. Pufahl, professor and past president of the International Graphic Arts Education Association; and Dr. Jack Simich, Education Director of the Graphic Arts Technical Foundation.

I am forever grateful to my family. My twin brother, Joseph, who is also completing his doctoral research at the University of Northern Iowa involving a national recruitment study in the graphic arts, has been a true inspiration to me. He has helped me to overcome obstacles and has encouraged me in fulfilling my dreams and growing professionally.

The completion of this work and the completion of my post-high school education would not have been possible were it not for my loving and supportive parents. My father, Otto, and mother, Mary, immigrated from West Germany and Czechoslovakia, respectively, with only a primary level of education. Yet, they sacrificed and saw to it that each of their five children would all complete a college education and would have opportunities in a new land to better themselves and contribute to society. To them I say, "Danke schoen," and "Dekuji vam!"

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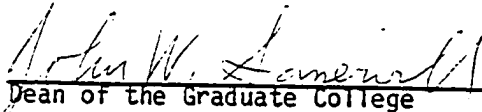
EMPLOYMENT NEEDS OF THE GRAPHIC ARTS INDUSTRY IN IOWA  
AS PERCEIVED BY IOWA GRAPHIC ARTS MANUFACTURERS  
AND IOWA GRAPHIC ARTS EDUCATORS

An Abstract of a Dissertation  
Submitted  
In Partial Fulfillment  
of the Requirements for the Degree  
Doctor of Industrial Technology

Approved:



Faculty Advisor



Dean of the Graduate College

John Frank Gindele  
Department of Industrial Technology  
University of Northern Iowa  
May 1989

## ABSTRACT

### Purposes

The two purposes of the research were to determine if differences existed between the perceptions of Iowa graphic arts manufacturers and Iowa graphic arts educators regarding current (1988) and future (1993) employment needs for skilled production workers and management and sales personnel, and to identify selected characteristics of manufacturers and educators in attempting to meet employment needs. The following supporting objectives were established:

1. To identify areas of agreement and disagreement as perceived by manufacturers and educators concerning: (a) current and future demand for skilled workers, management, and sales personnel, (b) comparison of those current and future demands, and (c) selected issues regarding employment and other factors.

2. To identify the anticipated number of skilled workers, management personnel, and sales personnel needed in the industry as perceived by the manufacturers considering current demand and probable future demand.

3. To identify selected characteristics of manufacturing companies plus educators and their programs.

### Methods and Analyses

Usable opinionnaires were returned from 181 manufacturers (72%) and 40 educators (87%). The three parts of objective one were tested against the null hypotheses using appropriate t-tests at the .05 significance level. The other two objectives were addressed in question form.

CHAPTER I  
THE PROBLEM AND ITS SETTING

The scope of Chapter I is defined in the following sections. They include the (a) statement of the problem, (b) statement of purpose, (c) statement of need, (d) statement of hypotheses and questions to be answered, (e) assumptions, (f) limitations, (g) definition of terms, (h) timeline, and (i) budget.

Statement of the Problem

The primary problem of this study was to determine current and future employment needs regarding selected employee functions for skilled workers, and management and sales personnel in Iowa's graphic arts industry, as perceived by Iowa graphic arts manufacturers and graphic arts educators. A secondary problem of this study was to identify some selected characteristics of Iowa's graphic arts manufacturers and educators and their programs.

Statement of Purpose

The purposes of this study were two-fold. The first purpose was to determine if differences existed between the perceptions of Iowa graphic arts industry manufacturers and Iowa graphic arts educators regarding the current (1988) and future (1993) employment needs for skilled, management, and sales personnel, identified by selected employee functions. To achieve this purpose, the following five objectives were established:

1. Identify areas of agreement and disagreement concerning the current demand in Iowa's graphic arts industry for (a) skilled workers, (b) management personnel, and (c) sales personnel.

2. Identify areas of agreement and disagreement concerning the demand in five years in Iowa's graphic arts industry for (a) skilled workers, (b) management personnel, and (c) sales personnel.

3. Compare current and five year demand among the manufacturers' group and among the educators' group in Iowa's graphic arts industry for (a) skilled workers, (b) management personnel, and (c) sales personnel.

4. Identify areas of agreement and disagreement concerning selected issues regarding employment factors and other factors relevant to Iowa's graphic arts industry.

5. Identify the anticipated number of (a) skilled workers, (b) management personnel, and (c) sales personnel needed in Iowa's graphic arts industry as perceived by Iowa graphic arts manufacturers, considering current demand and probable demand in five years.

The second purpose of this study was to gather demographic information relevant to the manufacturers and educators. To achieve this purpose, objectives six and seven were established as follows:

6. Identify specific selected company characteristics and employment practices regarding the respondent, his/her company, and recruitment and retention factors related to employees.

7. Identify selected characteristics regarding the Iowa graphic arts educator, his/her professional development activities, and graphic arts program characteristics as deemed important in attempting to meet the needs of Iowa's graphic arts industry.

### Statement of Need

The need for this study was based on several factors involving personnel in the graphic arts industry, professional and trade associations, government agencies, and education. These concerned groups were interested in identifying the future employment needs of the graphic arts industry because nationally, graphic arts technology is changing rapidly and a projected decline of young workers entering the labor market is forecasted. In addition, a shortage of skilled graphic arts workers is purported to exist. Research was needed to determine how these factors were affecting Iowa's graphic arts industry.

1. Technological Changes in the Industry. Rapid technological changes in the graphic arts industry may have a direct effect on the employment of personnel. Since data relating to employment needs of Iowa's graphic arts industry is in flux and incomplete, Dr. Nelson Eldred (1985a), researcher at the Graphic Arts Technical Foundation (GATF), believes educators should cooperatively work with industrial personnel to gather data and such involvement must be an ongoing part of the educator's professional development activities. While graphic arts educators are a supplier of workers, graphic arts manufacturers are a consumer of workers. Therefore, working cooperatively can foster greater understanding between the roles of industrial personnel and educators for the mutual benefit of both groups.

2. Career Guidance. Eldred (1985a) insisted that: "Educators must keep abreast of changing printing technology and changes in market demands in order to instruct students effectively" (p. 1-12). Knowledge of current and accurate data of Iowa's graphic arts industry can place

Iowa graphic arts educators and school counselors in the best position to offer proper career guidance to students who may be interested in graphic arts employment.

3. Curricula Update. Current knowledge of employment needs in Iowa's graphic arts industry could be useful for determining curricula content, to identify areas of concentration needed in existing high school and post-high school graphic arts programs, and to redirect if necessary the emphasis of existing programs. In quoting Bill Sherman, Vice President of Kodak, Swartz (1983) reported that graphic arts educators must be kept up to date on developments. Sherman said, "updating is essential in order to provide the skilled manpower necessary for the industry's continued growth" (p. 3). It is anticipated that graphic arts educators and curriculum designers would be able to update and adjust curricula to reflect current and future trends in the industry.

4. Current Research in Iowa's Graphic Arts Industry Appears to be Lacking. The literature indicated that current research focusing on the employment needs of the total graphic arts industry specifically related to Iowa, had not been conducted. The importance of this type of research was evidenced in other studies as discussed in Chapter II.

5. Support For This Study From The Graphic Arts Industry. Statements of support and assistance encouraging a study of the employment needs of Iowa's graphic arts industry have been received from personnel employed in trade associations, graphic arts companies, universities, and the Iowa Department of Education (Appendix A). The



support by these personnel provided additional evidence of the need for this study.

The Printing Industries of the Midlands (PIM) is a professional trade association representing graphic arts manufacturers in Iowa, Nebraska, and South Dakota. President James R. Frey indicated the results of this study would be important to Iowa graphic arts employers and educators offering graphic arts programs (J. R. Frey, personal communication, February 22, 1988).

Dr. Jack Simich, GATF's Education Director, also supported this study and said it would benefit the graphic arts industry and have a major implication to graphic arts education in Iowa. Simich indicated that this study might encourage personnel in other states to pursue similar research (J. Simich, personal communication, April 5, 1988).

John Mertz, former international deputy governor for the International Association of Printing House Craftsmen (IAPHC) and vice president of a Des Moines graphic arts company, also commented on the importance of the study. He indicated the information would be beneficial to personnel at the IAPHC and graphic arts companies in the midwest (J. D. Mertz, personal communication, February 23, 1988).

June Harris, consultant in the Department of Education's Career Information System of Iowa, thought that current information about employment needs in Iowa would be of interest to users of the Career Information System. Since the graphic arts industry is changing rapidly, Harris commented that any new information would be a valuable asset (J. Harris, personal communication, March 24, 1988).

Kristi Little, superintendent of printing and mail services for the State of Iowa, was particularly interested in this research project. Due to changes occurring in the industry, she has found it difficult to obtain skilled workers and management personnel for her inplant operations (K. Little, personal communication, March 14, 1988).

Dr. Jesus J. Rodriguez, associate professor and chairperson of the Printing and Management Department at Pittsburg (KS) State University, encouraged a study such as this and gave permission to incorporate parts of his doctoral dissertation into this research. He indicated that studies should be regularly conducted to determine employment needs in the industry (J. J. Rodriguez, personal communication, March 1, 1988).

Dr. Virgil R. Pufahl, professor of communications at the University of Wisconsin in Platteville, further supported this research. His endorsement letter as past president of IGAEA is also included in Appendix A (V. R. Pufahl, personal communication, August, 1988).

#### Statement of Hypotheses and Questions to be Answered

The following null hypotheses were established to support objectives one through four. Each of these hypotheses stated that there was no difference between the perceptions of Iowa graphic arts manufacturers and Iowa graphic arts educators regarding each of the selected factors as related to the selected employment areas listed on the opinionnaires. Both opinionnaires are found in Appendices B and C.

Throughout the study, the term "manufacturer(s)" refers to Iowa graphic arts manufacturer(s). The term "educator(s)" refers to Iowa graphic arts educator(s).

### Objective One: Hypotheses 1-3

The first objective was to determine areas of agreement and disagreement concerning the current demand for industrial personnel.

The following three hypotheses relate to objective one:

1. There is no difference regarding the current demand for skilled workers in selected production areas in Iowa's graphic arts industry.
2. There is no difference regarding the current demand for management personnel in Iowa's graphic arts industry.
3. There is no difference regarding the current demand for sales personnel in Iowa's graphic arts industry.

### Objective Two: Hypotheses 4-6

The second objective was to determine areas of agreement and disagreement concerning the demand in five years for industrial personnel. Hypotheses four, five, and six relate to objective two:

4. There is no difference regarding the demand in five years for skilled workers in selected production areas in Iowa's graphic arts industry.
5. There is no difference regarding the demand in five years for management personnel in Iowa's graphic arts industry.
6. There is no difference regarding the demand in five years for sales personnel in Iowa's graphic arts industry.

### Objective Three: Hypotheses 7-9

The third objective was to compare current demand and demand in five years for industrial personnel. This was done for the

manufacturers' group and for the educators' group. Hypotheses seven, eight, and nine relate to objective three:

7. There is no difference between current demand and demand in five years for skilled workers in selected production areas in Iowa's graphic arts industry.

8. There is no difference between current demand and demand in five years for management personnel in Iowa's graphic arts industry.

9. There is no difference between current demand and demand in five years for sales personnel in Iowa's graphic arts industry.

#### Objective Four: Hypothesis 10: Issues

The fourth objective was to determine areas of agreement and disagreement concerning selected issues regarding employment factors and other factors relevant to Iowa's graphic arts industry. Hypothesis ten relates to objective four:

10. There is no difference regarding each selected issue pertaining to employment and related factors in Iowa's graphic arts industry.

Hypothesis ten represents seven broad issues which comprise 26 individual issue statements as indicated in part two of the opinionnaires. These seven issues were:

1. To what degree has change occurred in skill and/or technical knowledge within the past five years as related to (a) skilled production workers in ten selected areas, (b) management personnel, and (c) sales personnel.

2. To what degree will automation affect the size of the skilled graphic arts production workforce?

3. Is there an adequate supply of graphic arts workers in the (a) production, (b) management, and (c) sales areas?

4. Can today's graphic arts programs in (a) high schools, (b) vocational high schools, (c) post-secondary vocational/technical schools, and (d) colleges and universities meet tomorrow's needs of the graphic arts industry?

5. Should personnel in the graphic arts industry set aside funds to upgrade equipment for graphic arts programs in Iowa's (a) high schools, (b) vocational high schools, (c) post-secondary vocational/technical schools, and (d) colleges and universities?

6. Should personnel in the graphic arts industry offer free training sessions to educators to help upgrade their technical skills and knowledge?

7. Should personnel in the graphic arts industry offer internship programs to graphic arts students/educators interested in upgrading their technical skills and knowledge?

#### Objective Five: Questions 1-3

Hypotheses were not formulated for objective five. Questions were used to determine the anticipated number of personnel needed by the manufacturers. These questions were as follows:

1. What is the anticipated number of skilled workers needed in selected production areas of Iowa's graphic arts industry as perceived by manufacturers, considering current demand and probable demand in five years?

2. What is the anticipated number of management personnel needed in Iowa's graphic arts industry as perceived by manufacturers, considering current demand and probable demand in five years?

3. What is the anticipated number of sales personnel needed in Iowa's graphic arts industry as perceived by manufacturers, considering current demand and probable demand in five years?

Objective Six: Questions 1-6

Manufacturers were asked for information needed to identify selected characteristics of Iowa graphic arts companies and questions related to employment practices. These questions were:

1. What is the desired educational attainment level for entry level (a) skilled production workers in 10 job categories, (b) management personnel, and (c) sales personnel?

2. What are the preferred sources of (a) skilled production workers, (b) management, and (c) sales personnel?

3. What are the three most important desired characteristics when hiring skilled production workers, management, and sales personnel?

4. What are the four most important problems in the retention of employees regarding skilled, management, and sales personnel?

5. What is the number of employees at this location?

6. What percentage of production time is devoted to each printing process at this location?

Objective Seven: Questions 1-12

Graphic arts educators were asked for information needed to identify selected characteristics of themselves, their professional

development activities, and their graphic arts programs. These questions included the following:

1. What is your age?
2. What is your highest level of educational attainment?
3. What type of institution are you affiliated with?
4. How many years have you taught graphic arts and taught totally?
5. Other than teaching, have you had working experience in graphic arts? If yes, how many years?
6. What professional development activities have you been involved in to keep current within the field of graphic arts?
7. What is your degree of teaching emphasis regarding the topic of graphic arts employment opportunities for (a) skilled production workers, (b), management personnel, and (c) sales personnel?
8. How often is your graphic arts curriculum updated?
9. What has been the effect on student enrollment in graphic arts in the past three years?
10. What is the degree of graphic arts program support from various selected individuals as identified in the opinionnaire?
11. How has your graphic arts curriculum changed in the past three years regarding course content and courses?
12. How will your graphic arts curriculum change in the next three years regarding course content and courses?

#### Assumptions

The following assumptions were made in pursuit of this study. These assumptions involved technology, people, and processes.

1. Technological change is a never ending process. Such change will continue to expand at an accelerated pace and will have an effect on equipment, processes, problems and employment trends in the graphic arts industry.

2. Groups of manufacturers and educators collectively have enough different experiences and contacts and opinions to be able to perceive current and future employment needs for skilled workers and for management and sales personnel in Iowa's graphic arts industry.

3. It is anticipated that educators at all levels have a professional need to keep abreast of the ever changing employment needs of the industry. To meet these needs, curriculum revision should be an ongoing process to reflect these changes.

4. The responses of company officials or other designated representatives who work closely with company personnel would be able to provide accurate information. It was also assumed that the respondents would be representative of the larger population of which they were a part.

5. Resources used to develop the mailing lists for manufacturers and educators were accurate and complete.

6. The data necessary for this study could effectively be gathered by means of a survey instrument. According to Best (1970), when opinions rather than facts are derived, an opinionnaire may be used for this purpose.



### Limitations

This study was conducted in view of the following limitations. These limitations involved the compilation of accurate mailing lists and gathering of reliable information.

1. The list of Iowa graphic arts manufacturers was limited to information provided by the Directory of Iowa Manufacturers: 1987-1988 (Iowa Department of Economic Development [IDOED], 1987a) and a membership list provided by PIM (Frey, 1987).

2. The list of Iowa high school graphic arts teachers was limited to information provided by personnel at the computer center in Iowa's Department of Education (IDOE, 1988a) and the Iowa Educational Directory: 1987-88 School Year (IDOE, 1987a). In addition, the Directory of Secondary, Technical, and Trade and Industrial Education Personnel in Iowa for 1987-88 was used (IDOE, 1987b).

3. The list of post-high school personnel was limited to names and programs in the (a) Industrial Teacher Education Directory (Dennis, 1987), (b) Membership Directory: 1987-88 (IGAEA, 1987), (c) Technical Schools, Colleges and Universities Offering Courses in Graphic Communications (GATF, 1988), (d) another computer list provided by the IDOE (1988b), the (e) college catalog microform collection listing Iowa technical and post-high school institutions (Career, 1987), and (f) communication with other educators.

4. The study was limited to graphic arts instructors who taught in the state of Iowa during the 1987-88 school year or in the summer or Fall of 1988.

5. Instructors and programs involved in graphic arts were part of this study. Graphic arts or communication courses taught in the art, commercial art, or business departments were excluded.

#### Definition of Terms

There are times when terminology may be unclear to certain readers of research. As a result, the following terms were defined to clarify their use in the context of the study:

GATF: An acronym for the Graphic Arts Technical Foundation.

Graphic Arts: "The technical area of producing printed products. The term covers design and layout, copy preparation, photoconversion, image carriers, image transfer, and bindery and finishing" (Dennis & Jenkins, 1983, p. 575).

Graphic Arts Educator: An individual responsible for instruction in one or more courses in applied graphic arts or printing, as opposed to the fine arts or commercial arts, in an approved Iowa graphic arts, graphic communications, or printing program at the high school or post-high school levels.

Graphic Arts Industry: A manufacturing industry involving the industrial printing processes of letterpress, lithography, screen, gravure, flexography, electrostatic, or other processes that produce multiple copies of graphic images.

Graphic Communications: "The technology of communicating information through photographic, drawing, and printed means" (Dennis & Jenkins, 1983, p. 575).

High School: High school includes grade levels 9-12 in Iowa's public and private institutions.

IDC: An acronym for the Iowa Development Commission.

IDOED: An acronym for the Iowa Department of Education.

IDOED: An acronym for the Iowa Department of Economic Development.

IDOES: An acronym for the Iowa Department of Employment Services.

IGAEA: An acronym for the International Graphic Arts Education Association.

Inplant: A separate graphic arts production department within a larger company where graphic arts is not the major task of the company.

Management Personnel: Employees responsible for establishing policies and making decisions (Dennis & Jenkins, 1983).

PIM: An acronym for the Printing Industries of the Midlands.

Post-High School Education: A level of education or training involving adults who are older than high school age.

Sales Personnel: Employees who sell graphic arts services, are responsible for customer relations, serve as technical representatives to potential customers, and advise customers about their printing needs.

Standard Industrial Classification (SIC):

The Standard Industrial Classification (SIC) is the statistical classification standard underlying all establishment-based Federal economic statistics classified by industry. The SIC is used to promote the comparability of establishment data describing various facets of the U.S. economy. The classification covers the entire field of economic activities and defines industries in accordance with the composition and structure of the economy. (Standard, 1987, p. 3)

The printing, publishing, and allied industries are identified as major SIC group number 27 and are described in Appendix D.

Technology: The practical application of scientific research. It may take the form of either inventions or innovations (Kearsley, 1984). Technology can also be considered a process which systematically organizes and uses people, devices, materials and procedures and knowledge for the purpose of providing solutions to practical problems.

Trade Plant (Specialty Shop): A company of one or more employees doing specialized graphic arts operations such as providing color separations, contact film, proofs, plates, or typesetting.

USDOC: An acronym for the United States Department of Commerce.

USDOL: An acronym for the United States Department of Labor.

#### Timeline

A timeline was developed to plan for the completion of this study. The timeline served as a guide by indicating when specific events were to occur and described tasks which needed to be completed prior to undertaking subsequent tasks. The timeline for completing the study is found in Appendix E.

#### Budget

No doctoral study can be undertaken without funding. An itemized budget (Appendix F) was developed describing the associated costs necessary to complete the study. During the proposal stage the budget was estimated at \$ 2,351.00 and increased to \$ 2,564.00 as the study progressed. Donations totaling \$ 1,687.00 were received for postage, typesetting and printing services. These donations reduced the final cost to \$ 877.00.

## CHAPTER II

### LITERATURE REVIEW

This chapter provides an overview regarding: (a) the changing marketplace, (b) the graphic arts industry, (c) the technological changes occurring in the graphic arts industry, and (d) the employment needs of the graphic arts industry. In addition, research findings related to the employment needs of the industry are presented, as well as published and unpublished material from personnel in trade associations, business, industry, government, and education.

#### The Changing Marketplace

In recent years the United States economic base has changed from manufacturing to service industries. The shift from production and assembly line jobs to professional, managerial, and technical occupations is expected to result in an estimated loss of 800,000 manufacturing jobs between 1986-2000 (Kutscher, 1987, p. 5; Personick, 1987, p. 30). There are two reasons for this. First, employment in all states is being affected as technology is used to increase productivity and reduce inefficiency by shifting from labor-intensive to capital-intensive industries. Secondly, population trends are impacting employment in manufacturing. While the nation's population is expected to increase from 240 million people in 1985 to 275 million people by 2000, its population and workforce will grow more slowly than anytime since the 1930's and the pool of younger workers entering the labor market will decline (Johnston & Packer, 1987, p. 76). Iowa's

population, however, is projected to decline 11% to 2,549,000 by the year 2000, further placing a strain on its workforce (USD0C, 1988b, p. 1; Goudy, 1987, p. 1).

With the nation's fastest growing jobs expected to be in management, executive, professional, technical and sales fields, higher education skills, including those skills needed to work with more sophisticated technology, will be required (Silvestri & Lukasiewicz, 1987; Kutscher, 1987; Johnston & Packer, 1987). It is argued that by 2000, workers will not be well matched to jobs. Johnston and Packer (1987) commented, "A gap is emerging between low education and skills of new workers . . . and the advancing skill requirement of the new economy" (p. 75). This gap is predicted to impact on the education and training industries.

Although employment in manufacturing is declining overall, employment in graphic arts manufacturing industries is increasing (Kutscher, 1987; USD0L, 1988). Simich (1980) said, "Printed communication is absolutely booming and shows no signs of slowing" (p. 6). To understand what is happening to Iowa's graphic arts industry, it is necessary to describe what is happening nationwide.

#### The Graphic Arts Industry

It is generally assumed that few industries have had such an influence upon the daily lives of each United States citizen as does the graphic arts industry. A brief report of this industry in the United States and Iowa, including employment by SIC groups, sub-divisions, and printing processes, is presented.

### Graphic Arts Industry in the United States

Nationally, the graphic arts industry is considered the main focal point of economic activity and a significant contributor to the Gross National Product (GNP). The industry employed 1,500,000 people in 1987 (Howe, 1987, p. 68; Semling, 1987, p. 33). The industry ranks first in the number of establishments with 53,000 fragmented industries throughout the United States (Bruno, 1987b, p. 40), and sixth as the largest employer in the manufacturing sector (Carruthers, 1987a, p. 58).

The industry continues to change rapidly with more changes occurring since the early 1980's than the previous 500 years (Schudel, 1987, p. 22). Growth is expected to continue at 3% to 3.5% annually (Forecast, 1988, p. 2). Employment in the industry can be reported three ways. These include employment by SIC groups, sub-divisions, or printing processes.

Employment by SIC groups. Graphic arts workers are employed in nine SIC industries. These industries are as follows: (a) newspapers: publishing, or publishing and printing, (b) periodicals: publishing, or publishing and printing, (c) books, (d) miscellaneous publishing, (e) commercial printing, (f) manifold business forms, (g) greeting cards, (h) blankbooks, looseleaf binders, and bookbinding and related work, and (i) service industries for the printing trade. A detailed description of these industries is provided in Appendix D.

Employment by sub-divisions. Employment in the industry can be discussed in terms of common sub-divisions such as: (a) production workers in the prepress, press, and postpress areas, (b) management personnel, and (c) sales personnel. The printing industry lost over

50,000 production workers through the 1970s, primarily due to new computer, laser, and telecommunication technologies (Howard, 1985, p. 44). Employment in the prepress areas was heavily affected most dramatically in the newspaper industry, due to the advent of electronic typesetting. Employment is being affected in the press area where control functions are becoming more automated. The postpress area of bindery and finishing is generally labor-intensive and has been slow to change until recently. In addition to these three production areas, growth and technological changes in an industry necessitate the increased importance for recruiting good managers and sales personnel whose roles usually require a post-high school education.

Employment by printing processes. A third way to describe the graphic arts industry is in terms of processes or methods used to manufacture printed products. Five major processes include lithography, gravure, flexography, letterpress, and screen printing. Printing by the lithographic and letterpress processes are projected to decline from 46% to 25%, and from 12% to 4%, respectively, through 2025, while printing by the gravure and flexographic processes are expected to increase from 19% to 25%, and from 17% to 25%, respectively (Bruno, 1987c, p. 47).

#### Graphic Arts Industry in Iowa

Although manufacturing employment in Iowa is estimated to decline by 3% annually between 1986-89, employment in Iowa's graphic arts industry has been increasing by 1.2% during the same time period (IDOED, 1987b, n.p.). In a 1985 Annual Survey of Manufacturers report, it was estimated that Iowa's printing industry had 18,900 employees, of which



9,200 were in production (USDOC, 1987, p. 5-18). From June 1986-87, Iowa job openings in graphic arts increased 17% from 593 to 694 (IDOOES, 1987, p. 35). Employment by SIC groups is reported in Table 1. As indicated, Iowa's newspaper, periodical, and commercial printing industries employ the most workers.

Table 1

Iowa Graphic Arts Employment by SIC Groups: 1985

SIC	Industry	Average Reporting Units	Annual Average Employment
2711	Newspapers	352	7,236
2721	Periodicals	46	2,245
2731	Book publishing	15	513
2732	Book printing	7	72
2741	Miscellaneous publishing	50	975
2751	Commercial printing, letterpress	151	2,051
2752	Commercial printing, lithography	139	3,343
2753	Engraving/plate printing	-	-
2754	Commercial printing gravure	-	-
2761	Manifold business forms	11	802
2771	Greeting card publishing	-	-
2782	Blankbooks/looseleaf binders	12	595
2789	Book binding & related work	9	77

Table 1 (continued)

SIC	Industry	Average Reporting Units	Annual Average Employment
2791	Typesetting	21	384
2793	Photo-engraving	3	23
2794	Electrotyping & stereotyping	-	-
2795	Litho platemaking services	4	76

Note. From Employment and wages: Annual averages 1985 by USDOL, 1986, pp. 171-181. Washington, DC: U.S. Government Printing Office.

#### The Technological Changes Occurring in the Graphic Arts Industry

Employment in any industry can be affected by technological changes. An introduction to some of the major technological changes in the graphic arts industry may indicate the direction in which the industry is going and provide some clues as to the demand for qualified workers within the industry. Trends affecting Iowa graphic arts employment may not be too different than those trends occurring nationally.

#### Emerging Technologies and Trends

Technological changes influence the need for new skills and affect the labor supply, education, and training programs. Johnston and Packer (1987) suggested that "Technology will introduce change and turbulence into every industry and job. In particular, the necessity for constant

learning and constant adaptation by workers will be a certain outgrowth of technological innovation" (p. 37).

Electronics (lasers, robotics, microprocessors, telecommunications, computers) continues to impact on employment. Cheaper, smaller, and more powerful micro-processing chips are finding greater use in process control in all areas of production, causing reduced dependence on manual labor.

The greatest technological advances are impacting on employment in the prepress production area, especially in composition and typesetting (Bruno, 1987c). During the 1970s photo and digitized typesetting caused the virtual death of linotype (Donovan, 1987) and reduced employment in the newspaper as well as other industries. Dertouzos and Quinn (1985) agreed:

Since the 1960's, . . . [the newspaper industry] has dramatically reduced production costs by reducing the amount of labor required to compose the modern newspaper. Today, the nation's daily newspapers employ about only as half as many workers in composing rooms as they once did. (p. 5)

It is estimated that electronics will cause a decline in one-fourth (24%) of the compositors and typesetters needed between 1978-90, and a 56% decline in one-half (56%) the number of electrotypers and stereotypers needed (Critchlow, 1983, p. 216).

At the present time desktop publishing is impacting the trade typographer (Forecast, 1988; Bruno (1987a). However, President Al Heeg of the Typographers International Association did not see desktop publishing as a threat. He stated that it "will eventually breed more demand for quality composition and typography" (Semling, 1986, p. 43). The use of pagination/image assembly (stripping) systems will be able to

output directly to press without going to film or any other assembly (Evolution, 1982). These systems eliminate silver-based film as well as labor-intensive manual layout and paste-up (Eldred, 1985a,b). Blunden (1984) argued that these systems reduce manual make-up by at least 75% (p. 13). The use of electronic scanners are reducing the time needed for stripping whereby color separations can be made in 20 minutes electronically, instead of 2 hours manually (Forecast, 1988, p. 8). Cameras are also becoming more automated with auto-focusing and online film processing. Laser platemakers can scan newspaper page paste-ups and simultaneously expose printing plates, either at the same location or in one or more satellite printing plants. All these changes impact on the workforce.

In the press room, electronic controls on presses can help speed up press work by scanning a plate, using the information to automatically set ink fountains, maintain ink/water balance, control registration, etc., and store the information about the press set-up for reprints (Peters, 1987a). One scanning densitometer is known to provide a 50% labor savings in make-ready (Bruno, 1981, p. 49). It is suggested that increases in press efficiency may reduce the crew size needed to complete a job (Forecast, 1988).

The postpress area of bindery and finishing is highly labor-intensive. In-line finishing systems are incorporating microchips which are helping to program paper cutters and folders, eliminating multiple operator set-ups and significantly reducing make-ready time. Robots will be used increasingly for material handling in the bindery area, displacing unskilled workers (Eldred, 1985b). Robots are already being

used at the Harris Corporation in Fort Worth, Texas and have resulted in an 80% reduction in hours worked (Malone, 1982, pp. 13-14). The long term effects of machines displacing manual labor may become threatening to the worker, as Gillespie (1985) stated:

Experts are said to predict that 'thinking' computers will, within 30 years, reduce the 25-28 million people currently employed in manufacturing in America down to less than 3 million! Raj Reddy, who is Director of Carnegie-Mellon's Robotics Institute, was described as worried that 'no one (in power) understands what's happening or grasps the extent of what's coming.' (p. 19)

### Impact of Technology on the Workforce

Does technology eliminate jobs? The experts are undecided. Lambert (1984/85) quoted Russell Runberger, senior research associate at Stanford University, who suggested: "Technology both eliminates jobs and creates new ones, making it difficult to recognize the direct effect increased technology is having on our economy" (p. 1). The focus of this section includes the (a) need for qualified employees, (b) shortage of workers, (c) need for education and training, and (d) need for educators to participate in meeting the employment needs of industry.

Need for qualified employees. Reports indicated there will be a reduction of one-fifth (20%) in the number of young people entering the labor force from 1980 through 1995 (Carruthers, 1987b, p. 44). The need for qualified graphic arts workers will be greater as the availability of younger workers decline. Johnston and Packer (1987) indicated the nationwide manpower shortage is just beginning. They indicated the supply of new workers was dropping towards the lowest point since World War II while the demand for skilled help was peaking. Carruthers (1987a) blames college and university educators for not supplying

graduates who fill the graphic arts industry's needs, and that top teaching talent from public school classrooms is being recruited into industry to create and manage internal training departments.

Shortage of workers. The shortage of qualified workers in all areas of production, management and sales has been acknowledged in the Kodak (1973) and GATF (Eldred, 1985a) studies. Of the estimated 100,000 graphic arts job openings annually in the United States, only 40,000 to 50,000 trained people will be graduated to fill these positions (Eldred, 1985b, p. 21; Rutherford, 1981a, p. 6). This difference poses a challenge to American educators.

Shortages of production workers are severe, especially in the prepress and press areas (Rutherford, 1981a). The following areas or specialists being affected the most include stripping (Printing trends, 1982), layout and design (Crouch, Dailey & Gunter, 1972), scanner operators (Forecast, 1988), plateroom (Eldred & Orr, 1981), and camera operators (Eldred, 1985a). Feuer (1987) stated: "the switch from manual to automatic printing presses created the need for smaller but more highly skilled crews" (pp. 30-32).

Shortages in management personnel are also occurring (Peters, 1987b). As technology changes, managers must keep up to date with current issues, policies, and consequences as related to plant operation and equipment use. Eldred (1985b) commented that top management was often the slowest to adopt to new technology. In citing Alessandrini, Peters (1987b) stated:

Moving a worker up the ranks to a supervisory position may not be the best way to fill management positions if the person lacks the managerial and people skills needed for the job. While

college graphic arts program graduates gravitate to these positions, many are going to equipment supply companies. (p. 37)

Additionally, Rutherford (1981a) stated that: "Printers are unwilling to pay the salary that's required to bring in a management graduate" (p. 7).

Shortages in sales personnel are just as critical as shortages of production workers (Eldred, 1985a). Sales people are affected by technological change and must be able to understand new computerized, automated, high-tech equipment and convince the customer of its advantages. Bruno (1987b) thought that high-tech equipment is so productive that the equipment is underutilized without the extra business and sales people to support it.

Need for education and training. Eldred (1985a) commented that workers must be flexible enough to accept change and understand printing processes to help change jobs quickly. Eldred (1985a) further stated that the focus of essential skills through the 1990's should be in "computer literacy, understanding systems concepts, visual literacy, and knowledge of high-tech equipment" (p. 1-34). In addition, Feuer (1987) thought that graphic arts employees were seriously deficient in "speaking, listening, mathematics, and problem solving" (p. 30). Eldred (1985a) reported that "today's entering printer craftsmen will need to retrain 5 times prior to retirement due to changing processes and techniques" (p. 7-11). Simich (1970) and Truitt (1986) reported that the graphic arts industry will see more management specialists and technicians with college training.

Educators must participate. Peckham (1988) argued that educators must study changes occurring in industry and relate these changes to their students, and said, "schools need to mirror life more closely" (p. 16). Eldred (1985a) also believed changes in industry must be reflected in curricula. Prior to designing and developing curricula, Connor (1986) suggested that "regional manpower needs must be identified in order to define types of training programs to be offered" (p. 25).

Eldred (1985a) indicated there was a need for additional graphic arts faculty. Since the level of staff affects the ability of educational institutions to attract bright young people into the program, the graphic arts education profession needs more faculty members with master's and doctoral degrees.

#### The Employment Needs of the Graphic Arts Industry

The importance of partnership programs between educators and industrial personnel will be addressed in this section. Studies pertaining to graphic arts employment will also be reported.

#### Partnership Programs

Horne (1972) stated that: "Industry is not on top of education, education is not on top of industry. They are partners" (p. 70). Numerous authors commented on the importance of developing a good relationship between education and industry (Mertz, 1988; Winters, 1986). Carruthers (1987c) also agreed, and said,

The partnership between graphic arts education and the industry it serves--when left untended--tends to worsen. . . . To break this cycle . . . both parties must communicate: educators depend upon input, feedback, and support from graphic arts managers, who in turn have to get more involved in the schools on which they



depend. All parties should be working together to promote the printing industry as a profession, beginning at the high school level. (p. 80)

Prior to discussing graphic arts employment needs studies, a brief discussion of graphic arts education in Iowa and how industrial personnel and educators can help to attract students into graphic arts, is appropriate.

Graphic arts education in Iowa. Iowa has an excellent educational system, but it also has some problems. Iowa's public school (K-12) enrollment is expected to decline by a third (31%) from its peak of 659,989 in 1969, to 459,000 in 1990 (Sharp, 1988, p. A9). The major national teacher shortage predicted by 1990 and beyond will also affect Iowa teachers (Renewing, 1986, p. xii). Fewer capable students are entering the teaching profession in Iowa and in other states, while experienced teachers, including graphic arts teachers, are leaving the profession.

In approximately 34 Iowa secondary schools, graphic arts is taught in grades 9-12. On the post-secondary level, graphic arts education and training is provided at 14 institutions including vocational and correctional centers, community colleges, and four year colleges and universities. Art or commercial art departments are not included in these numbers.

Graphic arts education programs in the United States and Iowa are struggling to survive. Both educators and manufacturers need to share, to some degree, part of the blame for shortages of graphic arts personnel. Some of these problems are:

1. Enrollment decline: Schools are cutting budgets and programs while the graphic arts industry must compete for fewer top high school students (Mertz, 1988; Claxton, 1987; Sprague, 1986; Berthelsen, 1986).

2. Teacher shortage: (a) Teaching majors are declining (Claxton, 1987), (b) teachers are leaving education and moving into industry (Jose, 1987), and (c) graphic communication teachers are getting older while fewer teachers are entering the field (Magee, 1984).

3. Industry image problems: (a) Students believe graphic arts is not a high-tech industry (Guldin, 1987), and (b) many graphic arts courses are dumping grounds for academic failures and incorrigibles (Rutherford, 1981b).

4. Curriculum lags industrial changes: (a) A significant gap still persists after 20 years in the educator's understanding of the industry (Carruthers, 1987b), (b) color use is increasing while few color courses are being taught (Eldred, 1985a), and (c) letterpress use is declining but is still being taught while the growing areas of gravure and flexography are not being emphasized enough (Eldred, 1985a).

5. Increased academic requirements: (a) Industrial arts and graphic arts programs are being dropped (Eldred, 1985a), and (b) vocational training is being ignored by students (Davis, 1987).

6. Lack of counselor support: (a) Highly talented students are not being directed into graphic arts by the counselors (Crouch, 1985), (b) the industry needs to exercise substantial influence over the counselors (Carruthers, 1987b), and (c) counselors are the most difficult to reach and are not informed about what graphic communication is (Mertz, 1988; Donaldson, 1981).

How industrial personnel can help. Since the industry does not have a great track record when it comes to promoting itself, authors have suggested there is a need for industrial personnel to be more visible in schools and to help students become interested in graphic arts. "Printers and suppliers can contribute curriculum assistance, career information, guest lecturers, industrial demonstrations, and visibility at school programs" (Eldred, 1985a, p. es-4). Peters (1987b), Simich (1987), Rutherford (1981b), and Berthelsen (1986) agreed.

How educators can help. Educators can help attract students into graphic arts employment by keeping current in the field through reading professional literature, being actively involved in professional organizations, attending local graphic arts association meetings, trade exhibits, taking students on field trips to local companies, attending workshops, seminars, etc. Additionally, recruitment efforts should be increased by teaching graphic arts as a modern technology (not as a craft), requiring students to have typing skills and computer experience (Rutherford, 1981b). It is further suggested that graphic arts educators work with industrial personnel to "sell" the graphic arts program to counselors and administrators (Peckham, 1988; Rutherford, 1981b).

Nationwide, school district personnel have been forming partnerships with business and industry personnel to assist students with career opportunities. In 1985, the Iowa State Board of Education and the Board of Directors of the Association of Business and Industry

agreed to promote Iowa partnership programs between education and business, industry, and labor groups. The goal stated:

The intent of the partnership program is to identify corporations, businesses, and industries which are willing to contribute equipment, material, and supplies which public education agencies have indicated would be useful in instructional aspects of the school environment. Additional state-level partnerships would be pursued. (Renewing, 1986, p. 14)

The research before the reader was a result of a partnership agreement between the researcher and personnel at the Printing Industries of the Midlands (PIM) in Des Moines, Iowa, and Congdon Printing Company, in Cedar Falls, Iowa. Financial support, typesetting, and printing was donated by officers in these organizations. Endorsements from personnel at the International Graphic Arts Education Association, Graphic Arts Technical Foundation, and PIM helped to make this research possible.

#### Graphic Arts Employment Needs Studies

A discussion of published studies, unpublished studies, and other related studies is presented in this section. Contrasts and comparisons were made regarding findings and conclusions by fifteen authors.

Since management and organized labor are becoming more aware of the need for closer ties with educators to supply workers, it is vital that educators know the needs of the industry. These needs can be found through a review of research studies.

Many studies regarding the employment needs of the graphic arts industry have been conducted by individuals affiliated with various organizations and by individuals completing graduate-level research. Some studies have been national in scope, others have been regional, while others have focused on the needs of manufacturers in particular

states. Many of these studies involved the growth and technological changes which took place in the industry and which had an effect on teaching methods and curricula, industrial practices, and employment trends.

Published studies. Presented in this section are selected major findings or conclusions of the authors as related to eight major published and unpublished studies involving employment needs. Crouch et al. (1972) studied the labor market region of Georgia and North and South Carolina to identify employer needs, types of equipment used, sources of labor, and to gather training information and provide a sound basis for curriculum development. The conclusions reported by Crouch et al. (1972) were summarized as follows:

1. Educators should teach more offset and letterpress processes.
2. The shortage of personnel ranked in order of greatest need is in presswork, layout and design, composition, and photography.
3. Schools should have offset duplicators and small presses for hands-on instruction.
4. Drafting was recommended as a course for students to help develop a background needed for graphic arts. Programs should stress adherence to directions and quality to best serve the needs of students and industry.
5. For most production areas, future employees should be taught general skills and knowledge about the industry, in high school, while specialized courses should be taught in post-secondary programs to promote and train employees.
6. A need for college educated sales and management personnel existed.
7. Educators and company representatives should work together to upgrade programs and produce qualified employees.
8. A need existed for students knowledgeable in line and halftone photography.

9. Employment opportunities exist for men and women in all areas although men are more physically adaptable to larger size presses and women are especially well adapted to the areas of composition and copy preparation. (pp. 110-112)

Crouch et al. (1972) further found that industry personnel were generally unaware of educational programs in their region. Items 2, 6, 7, and 9 above are still being discussed in the literature today where they continue to be applicable.

The first major comprehensive nationwide study of the graphic arts industry was known as the Kodak Graphic Arts Industry Manpower Study (Kodak, 1973). This study was directed specifically to educators and is especially important to this research since parts of the Kodak study were used as a guide. Researchers conducting the Kodak study sought to determine the current status of graphic arts employment needs, to predict those needs for the 1970's, and to assist educators with planning curricula to meet those needs. Of the 5,000 surveys sent to printers and owners, 1,033 (21%) were returned. Of the 150 surveys sent to equipment manufacturers, 44 (29%) were returned. These recommendations were briefly summarized as follows:

1. New people should be prepared for production and managerial positions.
2. Educators should develop student interest in the graphic arts.
3. A broad, industrial arts type program would be best to help students explore graphic arts technology. These programs should stress good work habits, attitudes, dependability, and ambition.
4. Graphic arts programs should emphasize the areas of layout and design, photo-composition, paste-up and copy preparation, camera work, stripping, offset platemaking, sheetfed offset presswork, bindery and finishing. Letterpress work should be de-emphasized.

5. Instructional programs should emphasize the development of technical knowledge in science oriented areas of chemistry, electronics, mathematics, photography, and mechanics.
6. Vocational programs must emphasize contemporary skill building in offset lithography, screen process and flexographic printing, and retraining programs.
7. There is a need for an accelerated development of industrial education and retraining programs.
8. Colleges must develop more sales and management personnel for the industry. Work-study programs were encouraged.
9. Post-high school programs should include safety and environmental control, applications of computers to graphic arts technology and management.
10. Two and four year colleges and universities should increase sales personnel programs and orient these programs towards job experience.
11. Colleges and universities should offer more continuing education activities. (pp. 35-37)

Items 1, 2, 5, and 8 above are still as important today as discussed by previous authors. This Kodak study has been used in other studies to compare and measure changes in the graphic arts industry. The study is considered a benchmark since this was the first national study on graphic arts employment needs.

Another national study, known as The GATF Manpower Study (Eldred, 1985a), was completed by researchers at GATF. GATF personnel used the Kodak study as a guide to determine how changes had occurred since 1973, and sought to examine technological developments and trends regarding the industry, training needs, and graphic arts education. The researchers indicated that while the graphic arts industry was growing, a shortage of qualified workers was occurring (Eldred, 1985a). Eldred's recommendations were summarized as follows:

1. Recommendations made in the Kodak study continue to be applicable.
2. Printers and suppliers should develop an educational policy.
3. Printers and teachers must increase recruitment efforts.
4. Teachers want more and better career information.
5. Training programs are needed to retain and promote existing staff.
6. Management must concentrate on increased productivity of sales and management personnel.
7. Support for public schools is needed because schools lack career guidance, there is a need to work with counselors, equipment costs are increasing, and there is a need for curricula assistance, career information, literature, industrial demonstrations, and graphic arts visibility at school programs. (pp. es-1-5)

Items 3, 4, and 7 above have also received much discussion in recent articles and studies previously presented.

Unpublished studies. Odesina (1988) studied the employment needs of the commercial graphic arts industry in the five midwestern states of Illinois, Iowa, Minnesota, Nebraska, and Wisconsin. The thrust of his study focused on employment in the prepress and postpress areas. He found that there is currently a great need for employees in proofing and paste-up/copy preparation (p. 64). Employment needs, however, were projected to be greater in ten years than at the present time in color stripping/masking, process color, and scanner operations (pp. 64-67). More workers will be needed in nine areas of bindery and finishing including hardcover binding by machines, perforating, embossing, laminating, perfect binding, saddle stitching, punching, foil-stamping, and shrink-wrapping (pp. 68-70; 72-73).



Odesina made four recommendations: (a) schools should update curricula in the previously cited areas to meet the employment needs of the industry, (b) educators and industrial personnel should help to recruit students and help train them in areas of copy preparation, photography, and bindery and finishing, (c) educators must reflect changes in curriculum based on technological changes to meet current and emerging practices, and (d) because the industry is changing so much, surveys should be conducted regularly to determine needs in the offset printing segment of the industry.

Four studies pertaining to employment needs in particular states were conducted by Rayford, Gray, Jose, and Rodriguez. Rayford (1967) investigated the current and future employment and training needs of Missouri graphic arts manufacturers as perceived by 126 vocational school graduates, 13 instructors, and 265 printing managers. He thought apprenticeships failed to supply the number of new printers needed and that graphic arts educators had an important role to play. He also thought his findings would be of value to school counselors, indicating a need for trained printers and for exposing students to job opportunities. A summary of Rayford's (1967) conclusions indicated: (a) not enough vocational students were being trained to meet the needs for employment in graphic arts production, (b) most job vacancies should occur in larger plants, (c) the training needs of new workers were adequately being met by vocational programs, but the training included too narrow a range of printing processes, (d) adequate training in cold type composition and duplicator operation was occurring, but more needed to be done in offset press work or on tape or electronic controlled

machines, (e) training was increasing in importance in areas of cold type and offset processes while hot metal and letterpress processes were becoming less important, (f) graphic arts vocational graduates were finding jobs and were remaining in the jobs they were trained for, and (g) at the time the study was completed it was not known what the effects of automation was on training and employment in the industry.

Gray (1970) studied the employment needs of the Texas newspaper industry. He sought to determine the current status of the industry and assess its adoption of technological changes by 1980. A summary of selected major findings indicated:

1. The use of offset printing would increase while the use of letterpress and stereotypes would decline.
2. Increases in press speed and capacity and four-color printing were anticipated as well as the use of electronic controls, automatic film and plate processors, phototypesetting, and the number of color separation departments.
3. A slight increase in management personnel was expected by 1980 while the number of mechanical jobs was expected to decline 0.3% in the number of employees needed by 1980.
4. Only 91 job vacancies were indicated--17 for management, 33 for mechanical department personnel, and 41 in other areas.
5. Seventy percent of the respondents thought that a college degree was not necessary for management personnel.
6. A twelfth grade education was indicated as the highest level for mechanical personnel by 92% of the respondents.
7. Inplant and apprenticeship training were indicated as major sources for employment for the mechanical department.
8. Two-thirds of the respondents expected to build new plants or expand present facilities.
9. Future skills needed by workers, most frequently listed by managers, should include a background in electronics, computers, photography, and offset work. (pp. 83-85)

Items 1, 2, 3, and 9 above are also being reported in the literature nineteen years after Gray's study was completed. Although one of Gray's findings was that a college degree was not necessary for management personnel, other previous studies indicated a need for more college educated managers. Gray further found that public school printing programs were not meeting employment needs and recommended that a study of Texas commercial printers be conducted.

Jose (1979) conducted a study in Los Angeles County, California, to identify knowledge, skills, and abilities necessary for employment in offset lithography occupations. To address the shortage of skilled labor and to have graphic arts curricula reflect the needs of the industry, he interviewed 45 business owners. Half the owners were content with hiring strippers and platemakers possessing entry level skills. The other half of the owners, however, desired more advanced skills for these newly hired personnel. The owners also desired new copy preparation and darkroom personnel to have advanced skills in their area of expertise. For newly hired pressroom and bindery personnel, entry level skills were sufficient.

A Texas study which fulfilled one of Gray's recommendations was conducted by Rodriguez (1979). He investigated the current and future demand for skilled workers in commercial printing plants by seeking the opinions of commercial printers, graphic arts educators, and trade service suppliers. Information regarding issues and actual needs for the number of skilled workers were sought. A summary of Rodriguez's study indicated:

1. Significant differences were found between three groups in six of 24 production areas regarding current demand, and in seven of 24 production areas regarding the demand in five years.
2. There were no significant differences from printers in each of the six Standard Metropolitan Statistical Areas (SMSA) relevant to the current and five-year demand.
3. Educators showed a significant difference in one of 24 production areas regarding the current demand for skilled workers, and in one of 24 production areas regarding the demand in five years.
4. When comparing current to five-year demands, all groups showed significant differences in all production areas.
5. When comparing current to five-year demands, significant differences were found among printers in all six SMSA's in 22 of 24 production areas.
6. When comparing perceptions of current demand to demand in five years, significant differences were found between secondary and post-high school educators in 23 of 24 production areas.
7. Each group showed significant differences in nine of 16 issues.
8. Commercial printers reported a perceived current demand of 1,948 skilled workers and a need for 3,455 more in five years. These numbers do not constitute the total demand for skilled workers in Texas. (pp. 71-79)

One recommendation made by Rodriguez (1979) was that similar studies focused on other segments of the graphic arts industry should be conducted. The general format and procedures adapted from his and other studies served as a guide for the present study.

Other studies. Other graphic arts related studies have been conducted. All of the following were unpublished except those identified with a "\*." The studies involved various relationships between graphic arts education and industry and to what degree, if any, educators were meeting the needs of the industry. These studies were as follows:

Glogovsky (1970) compared graphic arts processes used in industry with those taught at industrial arts teacher education institutions to determine the extent to which industrial arts teacher educators included contemporary industrial processes in their graphic arts curriculum. He found that not all industrial processes, recognized as important to industry, were taught (some were taught as units). Also, industrial arts education programs were not changing enough to reflect practices in the industry. Procedures used by educators to learn about the industry were inadequate. Glogovsky found the lecture method of teaching predominated classrooms and laboratories which indicated a general lack of equipment and facilities to teach psycho-motor skills. Curricular offerings and course content lacked uniformity in teacher education institutions.

Cox (1970) looked for significant differences between skills, related information, and procedures taught to prospective employees and those deemed important by employers in the states of Arkansas, Illinois, Kansas, Kentucky, Missouri, Oklahoma, and Tennessee. Selected findings and conclusions indicated that employers were unhappy that many graphic arts related skills and topics of information were not emphasized enough in the classroom while other skills and topics of information were over emphasized. Educators needed to emphasize managerial functions to a greater degree. Cox recommended more use of field trips, utilizing industrial personnel as resource people, and making more reference books available to students regarding managerial functions.

\*Sanders (1984) assessed secondary and post-secondary graphic arts curricula to determine instructional emphasis on primary printing

processes and content areas as identified in the Kodak (1973) study. Responses indicated that screen printing was the primary printing process most commonly taught, followed by lithography, letterpress, gravure, and flexography. He found that graphic arts educators at the secondary level were developing student interest, good work habits, attitudes and social skills. Post-secondary educators were emphasizing more science oriented courses, although chemistry and computer science courses were generally neglected. Low budgets at both educational levels were indicated to be the reason for limiting the expansion of new technologies being incorporated into the classroom.

Believing that educators must relate their curriculum to the changing needs of the industry, Cherry (1972) compared the opinions of Michigan lithographers and vocational printing instructors at two year colleges with respect to job entry skills required for a new employee. Employers identified 55 tasks, 516 sub-tasks, and 547 items requiring technical information related to the cameraman, stripper, platemaker, and pressman (p. 49). Cherry found that educators and industrial personnel were 90% in accord on the knowledge needed for entry-level employees. Teachers were found to be teaching 95% of the major tasks of what industrial people deemed necessary for job entry.

\*Keseman (1976) studied the graphic arts industry and education in Missouri to develop content areas for educational programs. He found that while graphic arts instruction continued to expand, few students were receiving such instruction. Also, most teachers lacked depth and preparation in graphic arts and requested help. Keseman concluded that graphic arts offerings generally lacked a coordinated approach, and

vocational technology programs were not serving their purpose well. Also, in many schools, graphic arts content was not reflecting what was happening in industry.

Bowling (1984) completed a needs assessment of the Knoxville, TN labor market to determine the feasibility of a post-secondary graphic arts program for the State Technical Institute at Knoxville. A summary of the major conclusions indicated that (a) employers and students described a need for a post-secondary training facility, (b) most respondents believed that such a program would help them advance to a better job with more pay, (c) the industry could tailor such a program to meet local needs, (d) without such a program, local industry would be forced to seek outside help for skilled workers and training in order to keep current with rapid changes in the industry, and (e) recommendations for 24 courses were made.

Rudisill and Hansen (Identification, 1975) identified tasks in photo-offset lithography occupations in Iowa. They studied the occupational areas of litho-cameraman, stripper, platemaker, layout man, paste-up man, and offset pressman. A summary of the responses from 174 newspaper and commercial printers indicated that:

1. Most Iowa graphic arts industries employed less than 10 skilled personnel.
2. Most employers were engaged in general commercial printing.
3. Offset lithography was used in 75% of the plants while letterpress use was on the decline.
4. Most of the industries were non-union.
5. The primary problem in the employment of graphic arts workers was the shortage of qualified applicants.

6. Many occupational titles were used with many personnel in small plants, completing the tasks required in all production areas.
7. Forty percent of the employees are in the production area of composition and paste-up.
8. Most industries required a high school or vocational school educational level for employment. About 30% of the respondents indicated that college or university training was desirable in the area of layout and design.
9. Graphic arts industries sought skilled people from vocational schools in the area of press operation more than any other production area.
10. Most of the skilled occupational personnel needed in the next five years would be in composition and paste-up and press operations. (p. 25)

Rudisill and Hansen (Identification, 1975) concluded: "Increased numbers of new people should be prepared for production and management opportunities in Iowa graphic arts industries in the next few years" (p. 126). Although this study specifically involved lithographic occupations, no major study focusing completely on the current and future employment needs of Iowa's total graphic arts industry had been undertaken. The literature indicated that very little research had been done in the field of graphic arts education in Iowa to meet the increasing demands in Iowa's graphic arts industry. What kinds of employment information can be gathered as a result of such an Iowa study? A formal needs assessment of Iowa graphic arts educators and manufacturers may provide such information. A concluding statement by Liedtke (1987) seems appropriate. She stated that,

Teachers should not wait for the industry-education partnership to just happen. They must be proactive and seek to establish the linkages and programs that will not only serve to further graphic arts education, but will also support the efforts of local industry. (p. 13)



### Summary

The graphic arts industry continues to increase in sales and volume. As technology continues to change rapidly and as the number of younger workers entering the labor market declines, the industry continues to have a shortage of qualified personnel in the prepress, press, and postpress production areas, and in management and sales positions. These factors impact on employment needs and the education and training industries related to graphic arts.

Numerous studies have been conducted addressing the employment needs of the graphic arts industry. While these studies focused on the employment needs nationally, regionally, and by states, only one study in 1975 focused exclusively on Iowa's graphic arts industry. It focused on one occupational group in only two SIC industries, and not on the needs of all nine SIC industries representing all company sizes.

Very little has been done to address the graphic arts employment needs in Iowa. Many authors agreed that educators and industrial personnel must work cooperatively to address mutual concerns. The objective of Chapter II was to gain insight into the problem addressed in this study and establish a baseline for further research. The current study of the employment needs of Iowa's graphic arts industry attempted to address these concerns.

### CHAPTER III

#### RESEARCH DESIGN

The purpose of this chapter is to systematically describe the procedural methods used to address the problem of the study. These procedures included the (a) identification of populations, (b) identification and selection of population samples and pilot-test samples, (c) selection of the survey method, (d) development of the instruments, (e) validation of the instruments, (f) procedure for collection of data, (g) procedure for conducting the pilot-test, and (h) procedure for conducting the research.

#### Identification of Populations

The populations used in this study included Iowa graphic arts manufacturers and educators. The educators represented high school and post-high school levels.

#### Iowa Graphic Arts Manufacturers

Several sources were used to identify the 715 Iowa graphic arts manufacturers (Appendix G) available for the study and were identified in the Limitations section of Chapter I. In addition, the current information regarding names and addresses of Iowa publishers of newspapers, magazines, and journals were reviewed in the Gale Directory of Publications (Gill & Boyden, 1988), and Editor & Publisher International Yearbook (Editor, 1988).

### Iowa High School Graphic Arts Teachers

Both public and private Iowa high schools were investigated to identify graphic arts and graphic communication programs and instructors responsible for teaching one or more graphic arts courses in grades 9-12. Information was gathered from computer printouts and directories listed in the Limitations section of Chapter I. In the Spring of 1988 a list of teachers was developed as a potential population for the study. The list was readjusted in the Fall of 1988 to reflect additions and deletions. Educators identified as teaching graphic communications were contacted by postcard or telephone to verify whether or not they were responsible for teaching graphic arts and not teaching a drafting course which may also be part of graphic communications but which would not meet the criteria for this study. Educators were also asked to specify the department they taught in. In some cases the principal or head secretary of the school was contacted for this information. This information was necessary to identify instructors in industrial arts, industrial technology, technology education, vocational, or trade and industry departments, and remove names of art department instructors who would not meet the criteria for the study. Prescreening postcards (Appendix H) were sent to these teachers to identify courses and grade levels and gather other information. A master list of 36 high school teachers was developed.

### Iowa Post-High School Graphic Arts Educators

Post-high school educators and trainers specializing in graphic arts or printing were identified from sources listed in the Limitations

section of Chapter I and from Frey (1987), Freitag (1988), and other educators. Instructors and programs at correctional facilities were also identified. Public and private, independent two and four year Iowa college and university programs were investigated (IDOE, 1987a). Programs at these institutions were evaluated by checking the respective college catalog which provided potential names of instructors as listed in the respective staff or faculty sections.

Prescreening postcards (Appendix H) were then sent to the instructors or department heads to gather further information. Returned postcards also indicated names of instructors who were not previously identified. In the Spring of 1988 a master list of post-high school instructors was developed as a potential population for the study. The list was readjusted in the Fall of 1988 to reflect any changes and was updated to include 27 names.

#### Identification and Selection of Population Samples and Pilot-test Samples

Surveying an entire population is not always feasible or practical. Costs and time can prohibit contacting every member of a population especially when the population is large. Since it is generally assumed that the purpose of sampling is to identify a smaller representative segment of the population which can be used to provide data to make generalizations concerning the larger population, a percentage of the total population was used for the manufacturer's study.

### Iowa Graphic Arts Manufacturers

In consultation with the advisory committee and Dr. Harley E. Erickson, statistician, a sample population of 250 was determined to be sufficient for the study. The sample represented 35% of the total available population. It was further determined that a pilot-test of 10% to 12% of this sample would be used. To fairly represent the entire industry by the major sub-groups and by employee size, a proportional stratified random sample was used for the sample and the pilot-test.

Names of manufacturers were placed on separate colored index cards, color coded by employee size for small, medium, and large. Small companies represented 1 to 20 employees, medium size companies represented 21 to 50 employees, and large companies represented 51 or more employees. All cards were given a code and divided into a matrix representing the SIC number and three company sizes.

Thirty-five percent of the cards representing each SIC number and company size were randomly selected using the last 3-digits of the code number and table of random numbers (Borg & Gall, 1983). A pencil point was dropped onto the book opened to pages 906-907 listing random numbers. Where the pencil point made a mark, the process of identifying the right-most 3-digit numbers began.

From SIC industry group 271, 55 cards were randomly selected for the sample to represent small companies. Fourteen cards were randomly selected to represent medium size companies, and 6 cards were randomly chosen to represent large companies. This process was repeated for the remaining SIC industry groups.

The entire process was then repeated to select an additional 30 names for use in the pilot-test. For SIC 271, 5 cards were selected to represent small companies; 2 represented medium companies; 1 represented a large company. This process was also repeated for each of the SIC groups.

Names, addresses, and code numbers for all 250 samples and 30 pilot-tests were entered into a personal computer database. Because Frey suggested the opinionnaires be directed to the presidents or owners of these companies, the database included the names of these officials.

#### Iowa Graphic Arts Educators

Since the total population of Iowa graphic arts educators was small in number as compared to the population of manufacturers, it was decided to use the total population of 36 high school and 27 post-high school instructors. The names were entered into the database and coded for jurors, pilot-test populations and sample populations. Each educator was given an identification number to be used for follow-up purposes.

#### Selection of the Survey Method

A review of the literature was conducted concerning methods used in gathering data. It was decided from this review that the study would be conducted using the opinionnaire survey method since this method is best used when a population is large and geographically dispersed.

#### Development of the Instruments

The opinionnaire instruments for the manufacturers (Appendix B) and educators (Appendix C) were designed and developed to address the

hypotheses, issues, and questions pertinent to the study's objectives. The design and layout of the instruments reflected questions and information gleaned from the literature and from graphic arts educators, industry personnel, trade association personnel, and suggestions by the committee members and statistician.

The first two parts of both instruments sought the respondents' opinions. Since opinions are nothing more than stated attitudes, Best (1970) suggested that an opinionnaire or attitude scale could be used for this purpose. The most common types of attitude scales constructed are Likert scales (Borg & Gall, 1983) which allow the assignment of symbols or numbers to individuals or their behavior. In responding to a Likert-type scale the respondent indicates agreement or disagreement with each item on an intensity scale. Miller (1977) said, "this scale is highly reliable when it comes to a rough ordering of people with regard to a particular attitude . . ." (p. 89).

The manufacturers' opinionnaire was divided into four parts. Part I was designed to gather data regarding perceived current demand and demand in five years for skilled production workers and management and sales personnel. A four-point Likert-type scale was used to seek opinions regarding these general employee job functions. Part II was designed to seek opinions regarding selected issues and questions dealing with employment and related factors. It involved three and four-point Likert-type scales. Part III was designed to seek information regarding the actual demand and demand in five years for the number of graphic arts skilled production workers, management, and sales personnel at the respondent's plant site. Part IV was designed to seek

information describing selected company characteristics and employment practices in Iowa.

The first two parts of the educators' opinionnaire were the same as the manufacturers' opinionnaire. Part III of the educators' instrument, however, dealt with selected characteristics of the educators and their professional development activities and programs.

#### Validation of the Instruments

According to Courtney and Sedgwick (1970), "validity is the extent to which an instrument measures what it is supposed to measure or does the job it is supposed to do" (Pkg. 4597, p. 3). Graphic arts professionals can be appropriately used to determine the validity of newly designed instruments which relate to graphic arts.

Names of Iowa graphic arts educators who were considered to have exemplary programs and were well respected in the graphic arts profession were identified as potential jury members by their peers. Names of potential jury members representing manufacturing and education were also obtained from the PIM president. The list of 21 potential members included six manufacturers, six high school teachers, three post-high school vocational instructors, three university professors, and three professional trade association officers. A letter was developed and sent to each of them soliciting assistance. Twelve people volunteered to validate the preliminary instruments (Appendix I).

During July and August of 1988, these individuals received a draft copy of the opinionnaires and a cover letter specifically explaining their tasks and timeline. They were asked to critique the opinionnaires



in terms of the content of the questions, phrasing of the questions, the clarity of instructions, and significance of the questions in relation to the objectives and purpose of the study.

Suggestions made by the jurors and the advisory committee resulted in revisions which were made prior to having the instruments typeset, reproduced, and pilot-tested. Revisions in the manufacturers' opinionnaire included adding a purpose statement to the front cover and adjusting the time needed to complete the instrument. Suggestions made by jurors for the first three parts of the manufacturers' opinionnaire included a listing of five items within the design and layout category, and the adding, deleting, and rewording of terminology. Changes in the fourth part also included adding and deleting terms and rewording of certain items. The first two parts of the educators' opinionnaire were similarly changed to reflect changes made in the manufacturers' opinionnaire. Part III of the educators' opinionnaire included some rewording and item additions.

One educator commented that the instrument was nicely designed. Another thought it included good issues and questions. Still another indicated the instrument had the validity necessary to obtain the desired purposes and objectives. One manufacturer thought that the instrument design provided for quick responses and especially liked part III which dealt with company employment trends. He stated, "It makes them [the manufacturers] think about the future [employment trends]. The dollar [incentive] shows you're interested in getting back the questionnaire" (D. Heuss, personal communication, August 15, 1988).

### Procedure for Collection of Data

A systematic plan of procedure was necessary to minimize possible problems with data collection and to maximize usable response rates. Numerous books and journal articles were read regarding suggestions and techniques used in questionnaire design. Formal coursework regarding survey design and an internship experience involving the design and implementation of a survey were helpful in the development of the opinionnaires used in the study.

Don Dillman is considered by many to be an expert in designing effective mail and telephone surveys. As an author of a book and numerous articles regarding survey design, Dillman has been quoted by researchers and other individuals involved in survey methodology. Professor Dillman's "Total Design Method (TDM)," published in 1978, emphasized careful attention to all details of the survey process from inception to completion. TDM was utilized as much as possible in this study. Dillman, Dillman, and Makela (1984) said, "It [TDM] has been shown capable of consistently producing rates above 60 percent in samples of the general public" (p. 49). Many tips and techniques used by Dillman and others were incorporated in the design and dissemination of the opinionnaires. These techniques included the design of a prenotification postcard, cover letter, survey instrument, incentive literature, follow-up thank you/reminder postcard, and second and third follow-up letters. Samples of these items are found in Appendices B and C. When used properly, each of these items are designed to maximize the return of completed opinionnaires.

Three factors that routinely and consistently produce important increases in the return rate of questionnaires have been reported by designers of questionnaires. McKillip (1984) said these factors included the "respondents' interest in the questionnaire, the number of contacts with respondents, and the use of a small monetary incentive . . ." (p. 77). Although interest in the topic is considered to be the best predictor of rates of return, the following additional techniques were used to increase the return rate:

#### Pre-Notification Postcard

Numerous authors stressed the importance of sending a prenotification notice to those who would be receiving a questionnaire to complete. Such a notice has been proven to be significantly effective in improving response rates (Wu & Vosika, 1983; Childers & Skinner, 1979). Rucker, Hughes, Thompson, Harrison and Vanderlip (1984) thought prenotification's were effective because they served to identify and personally introduce the researcher to the potential respondent, discuss the study's purpose, and request cooperation. These cards were sent to 250 manufacturers and 46 educators.

#### Cover Letter Accompanying Survey Instrument

A properly designed cover letter is so important that it can help to facilitate the success or failure of a survey project. Each part of the letter can contribute to an increase in the questionnaire response rate. Several authors listed a number of items to consider when designing a cover letter. The following items were utilized in the study:

Personalization. Personalization, such as typing the recipient's name, use of the second person (you, yourself), dating the document, using the sender's real signature made with a blue ball-point pen which makes an impression on the document, was used. Additionally, an incentive was provided. Some authors stated these techniques could increase response rates by several percentage points (Erdos & Morgan, 1983; Dillman, 1978).

Requesting a favor. Asking for a favor can increase the response rate. Erdos and Morgan (1983) thought that this increase could be as much as 2 to 3% (p. 106).

Emphasize importance. The purpose and importance of a project to the recipient, profession, industry, institutions, or group of people the recipient is affiliated with, was emphasized. Dillman (1978) and Erdos and Morgan (1983) commented that such emphasis was essential. Baumgartner and Heberlein (1984) indicated that salience has a powerful effect on response. They said, "Surveys judged to be highly salient to respondents obtained a 77 percent response rate . . ." (p. 67).

Stress ease of completion. Erdos and Morgan (1983) further suggested the author indicate that the questionnaire could be answered easily in a short time. They said this statement should be made even if the questionnaire was a short one. This information was indicated in the cover letters and on the opinionnaires.

Enclose a stamped reply envelope. The sender should always enclose a stamped reply envelope. Using commemorative rather than metered stamps makes the contents appear more personal looking and not like a business letter. A stamped envelope has a better chance of being used

because no one likes to throw away money, such as an unused stamp (Erdos & Morgan, 1983; Blumberg, Fuller & Hare, 1974). Stamped returns have been shown to raise response rates by at least 2% (Dillman et al., 1984, p. 51). Other studies have shown that when using first-class postage on a return envelope as compared to using business reply postage, the response rate increased 6% (Baumgartner & Heberlein, 1984, p. 72).

Commemorative stamps were used with all correspondence.

Confidentiality. It is important to let the recipient know that the questionnaire data will remain confidential and the data would be analyzed and reported on a group basis only. A code number was visibly placed on the instrument and the recipient was told the code number would be used only to send follow-up notices to nonrespondents.

Offer something to the recipient. An offer to send the recipient a summary of the report indicates the willingness of the researcher to do something for the recipient. Also, an invitation to call the sender if the recipient has any questions should be indicated along with the sender's telephone number (Dillman, 1978). Both techniques were used.

Additional incentives. Incentives included with the survey rather than a future promise to send an incentive can significantly increase the response rate, including the return of more completely filled out questionnaires (Paulillo & Lorenzi, 1984). Cash incentives appeared to be the best and show a symbol of trust (Dillman, 1978). Erdos and Morgan (1983) indicated that money was the most effective, least biasing, easy to obtain and mail, and useful to all: "Dollar bills are probably the incentives most often used in the United States today. In most surveys such incentives will substantially increase the percentage

of response . . ." (p. 95). Shuttleworth (1931) indicated a cash incentive group returned 2.7 times as many replies as opposed to a group not receiving a cash incentive (p. 654). Studies noted by Armstrong (1975) plus Hopkins and Podolak (1983) were equally impressive. Hopkins and Podolak (1983, p. 169) noted that six studies using \$1.00 as an incentive brought between a 10% to 52% response rate, while Hackler and Bourgette (1973, p. 279) showed a 78% response rate versus a 39% return rate when \$1.00 was not given. A crisp \$1.00 bill was included in the initial mailing of each opinionnaire. The cover letter contained a description and purpose of the incentive, stressing that the incentive was not in payment for the respondent's time and trouble, which would be an insult, but rather a small token of appreciation for the respondent's cooperation.

As a further inducement to complete and return the opinionnaire promptly, the recipient received a gift certificate coupon to be eligible for a \$25.00 cash drawing and a summary of the survey results. To qualify for these two incentives the completed opinionnaire had to be returned by a specified date.

Importance of sender's organization. The importance of the sender's organization was purported to lend credibility and significantly increase response rates. University sponsored studies were known to obtain a 10% higher response rate (Baumgartner & Heberlein, 1984, p. 66). Therefore, the cover letters were typed on university stationery.

### Survey Instrument: Format and Design

The instrument was designed with plenty of white space so as to appear that it will be quick and easy to complete and that the survey was important enough for the sender to have it professionally designed and printed. An 8-page 11" x 17" folded booklet format was used for the opinionnaires. The opinionnaire was printed on pastel colored paper so as to be more noticeable from the traditional white paper found on most peoples desks and acted as a psychological reminder for the recipient to complete and return it.

Front and back covers. Dillman (1978) suggested that the front and back covers should not have any questions on them. The front cover should include an interesting title and a graphic illustration, any needed directions and definitions, a code number, and the name and address of the study's sponsor. Dillman (1978) plus Erdos and Morgan (1983) indicated that the back cover should thank the respondent for his/her cooperation, invite additional comments or suggestions about any subject mentioned in the questionnaire, and offer a promise to send a summary of the results. These suggestions were followed.

### Follow-up Thank You/Reminder Postcard

Follow-up postcards were used to thank the individuals for returning the opinionnaires or served as a friendly reminder to do so. These reminders have been known to reduce the percentage of nonrespondents and were found to cause a significant increase in the rate of return, ". . . a difference which will not be made up even after late reminders" (Blumberg, Fuller, & Hare, 1974, p. 122). Dillman

(1978) and Linsky (1975) suggested the postcards should be sent out on a Tuesday, one week after the initial mailing. While Kephart and Bressler (1958) claimed such a notice could effectively increase the rate of return by 16% (p. 125), Heberlein and Baumgarten (1978) indicated this could be as high as 20% of the initial sample (pp. 450-451). Follow-ups are so crucial to increasing response rates that Lockhart (1984) argued: "Reminders work, and more reminders work better" (p. 95). The effect of follow-up postcards and letters on the return rate as used in this study is indicated in Appendix J.

#### Second Follow-up Letter

A second follow-up letter with another questionnaire should be mailed exactly three weeks after the original mailing, informing the nonrespondent that he or she has not been heard from (Dillman, 1972; Childers & Skinner, 1979). This was also done. Dillman commented that persistence was especially crucial. Heberlein and Baumgartner (1978) stated that a second follow-up notice could yield as much as a 12% return (p. 451). With this reminder, Erdos and Morgan (1983) suggested the researcher may want to include another incentive. A packet of coffee and another gift certificate for a cash drawing and summary of the results were included in the second and third follow-up letters. Also, a hand written post script urging response was used in both follow-up letters as some authors believed this technique could yield a higher return rate than a printed post script.



### Third Follow-up Letter

A third follow-up letter to nonrespondents was sent out seven weeks after the original mailing. Erdos and Morgan (1983) thought this letter could increase the response rate by a few more percentage points. Heberlein and Baumgartner (1978) indicated a third follow-up notice could yield another 10% return (p. 451).

### Procedure for Conducting the Pilot-test

Fox (1969) indicated that newly constructed survey instruments should be pretested. Clover and Balsley (1984) concurred, and said, ". . . experienced investigators know that pretesting, in the long run, actually saves time, effort, and money" (p. 172). Pretesting can help to improve the reliability of the opinionnaires by identifying any weaknesses in their design, and to obtain some dummy data in which to pretest the mock-up tables and statistical treatment. The opinionnaires were pretested in September and October, 1988.

### Selection of the Pilot Participants

Clover and Balsley (1984, p. 172) suggested that only 15-20 pilot-tests were necessary to indicate most of the revisions likely to be needed. Thirty manufacturer opinionnaires were pretested which included a 10% to 12% proportionally stratified random sample of the sample population. Stratification was by SIC groups and size as previously described.

Because the entire population of Iowa graphic arts high school and post-high school educators would be surveyed, some adjustments needed to be made for the pilot and jury members. Of the 63 available educators,

9 were used as jurors and 8 were used for pilot-testing. The remaining 46 educators were available for the study. At no time were jury or pilot-test members of the manufacturing or education groups included in the main study. Pilot-test participants were not told they were part of a pilot-test group.

#### Distribution of the Pilot Instruments

Prenotification postcards, the instrument package, and follow-up correspondence were utilized in the pilot-test. After the completed opinionnaires were collected they were evaluated for any necessary changes in format style or rewording. Any additional adjustments to the instruments were shared with the advisory committee. Several changes were made prior to retypesetting and reproducing the opinionnaires for the sample population. In the educators' opinionnaire, a few typographical errors were corrected. Also, several phrases were retypeset in bold letters. Column heads were reworded in part I of each instrument.

Three changes were made to parts III and IV of the manufacturers' opinionnaire. In part III, it was discovered that directions two and three had to be reworded in order to obtain the correct response from the recipient. An additional note was written and enclosed in a box which stated: "These numbers do NOT reflect numbers of workers presently employed. They reflect anticipated changes in number of workers needed." In this way it was anticipated that the respondent would not inadvertently list in the current demand column the number of workers presently employed. In part IV, question 30 was reworded and an

additional sentence was added for clarification. Likewise, question 33 was reformatted and the word "specify" was moved closer to item 8.

#### Procedure for Conducting the Research

Before a research study involving people could be conducted, university policy required authorization from the graduate dean. On June 23, 1988, an authorization to conduct research involving human subjects was granted. This letter is found in Appendix K.

To begin the study, it was important to first prepare media announcements indicating that a study of Iowa's graphic arts industry would soon be conducted. This preliminary preparation preceded the actual steps for conducting the research.

#### Preliminary Preparation

Support for this study was received from people in government, trade, and professional organizations. Endorsement letters supporting the study were included with the cover letter in the first mailing. The support was requested to encourage a high response rate and to reassure participants of the advocacy of the study.

Spot announcements promoting the study (Appendix L) and encouraging participation were published in the September, October, and November, 1988, issues of PrintNews which were sent to PIM members. Announcements were also submitted to the editors of the Des Moines, Iowa City, Omaha/Council Bluffs, and Waterloo Craftsmen Clubs for publication in the May, September, October, and November, 1988, newsletters. Local membership in these clubs included company officials, production, management, sales personnel, and educators.

In the Fall of 1988, the purpose of the study was explained to members of the Waterloo Club and members attending a combined meeting of the Iowa City and Waterloo Clubs. Members were encouraged to complete and return the opinionnaire if they received one.

#### Conducting the Research

Prenotification postcards were mailed on October 25, 1988. On November 1, 1988, the opinionnaire package was mailed. It contained a first-class 9" x 12" envelope, a personalized cover letter, an endorsement letter, a coded opinionnaire, crisp \$1.00 bill and gift certificate incentives, and a preaddressed and stamped 6" x 9" return envelope. The cover letter further explained the purpose of the study and encouraged the recipient to participate by November 21. As an added incentive, if the recipient returned the completed instrument with the gift certificate post-marked by November 14th (one week earlier), he or she would become eligible to enter a cash-drawing contest and receive a copy of the survey results, if desired.

On November 8, 1988, a follow-up thank you/reminder postcard was sent to the same individuals. This was followed on November 18, 1988, by a second follow-up package mailed to nonrespondents. Each package included a different personalized cover letter, a second opinionnaire, additional incentives including a packet of Sanka coffee and a gift certificate, and another return envelope. The due date for returning the instrument was December 10th. However, if the recipient returned it with the gift certificate post-marked by December 3rd, he/she would

become eligible to enter a cash-drawing contest and receive a copy of the survey results, if desired.

On December 11, 1988, a third follow-up package with similar materials was mailed to the remaining nonrespondents. December 31, 1988 was chosen as the post-marked deadline for the return of the last acceptable opinionnaire which would be included in the study.

#### Additional Considerations

From October through December, 1988, personal telephone calls were received from and sent to several manufacturers. These calls helped to answer questions about the study and helped to clarify some of the data received. Educators were also contacted and nonrespondents were encouraged to complete and return the opinionnaires.

Although 250 manufacturers received an opinionnaire for the main study, the total possible number was raised by three ( $N = 253$ ). A major publisher received an opinionnaire and made four copies to be completed by individuals in charge of separate departments. The individuals completed those parts of the instrument which were appropriate to their particular department. Since the publishers' employee relations manager was unable to merge the data onto one opinionnaire form and return the form to the researcher, all four copies were returned to the researcher. In consultation with the major advisor, it was deemed appropriate to include these opinionnaires in the total return.

By December 31, 1988, 202 opinionnaires were received from the manufacturers and 41 were received from the educators (Appendix J). As the instruments were returned they were prescreened to sort out the

unusable ones. Twenty-one opinionnaires from the manufacturers and one opinionnaire from an educator were deemed unusable for the following reasons: Six respondents said they were not qualified to complete the opinionnaire, two people indicated the instrument was not applicable, one said the company went out of business, seven said they were small publishers or did minimum printing, and two opinionnaires were returned sloppily and partially completed. Opinionnaires from three manufacturers and one educator were returned blank with no reason given. Therefore, 181 manufacturers (72%) and 40 educators (87%) returned usable opinionnaires. These instruments were delivered to the data processing people.

The gift certificates seemed to influence many of the respondents to complete and return the opinionnaires by the earlier specified dates. Of the 181 manufacturers who returned usable opinionnaires by the earlier date, 66% requested to enter the cash-drawing contest and 62% requested a copy of the survey results. Of the 40 educators who returned usable opinionnaires, 73% requested to enter the cash-drawing contest and 75% requested a copy of the survey results. Jurors or pilot-test populations were not included in these numbers. A letter to the winners of the cash-drawing contest and letter to individuals requesting a copy of the survey results are found in Appendix M.

## CHAPTER IV

### DATA PRESENTATION AND ANALYSIS

The scope of this chapter includes an overview of seven sections. These sections include the: (a) response to data collection opinionnaires, (b) description of statistical treatment, (c) perceived demand for personnel Iowa-wide, (d) Iowa graphic arts issues and questions, (e) actual demand for personnel at plant sites, (f) company characteristics and employment practices, and (g) characteristics of educators, their activities, and programs.

#### Response to Data Collection Opinionnaires

Of the 181 manufacturers who returned usable opinionnaires, the manufacturers reported from 69 of 99 Iowa counties as indicated in Figure 1. Of the 40 educators who returned usable opinionnaires, the educators represented institutions located in 22 Iowa counties as indicated in Figure 2. The numbers for the manufacturers and educators did not include juror members or those who assisted in pilot-testing of the opinionnaires.

#### Description of Statistical Treatment

After reviewing the literature and in discussions with the statistician, a decision was made to use several statistical methods to analyze the data from the returned opinionnaires. The statistical treatment of data included both inferential and descriptive analyses. Likert-type scales were utilized in parts I and II of both instruments in which the respondent was asked to indicate his/her preference for

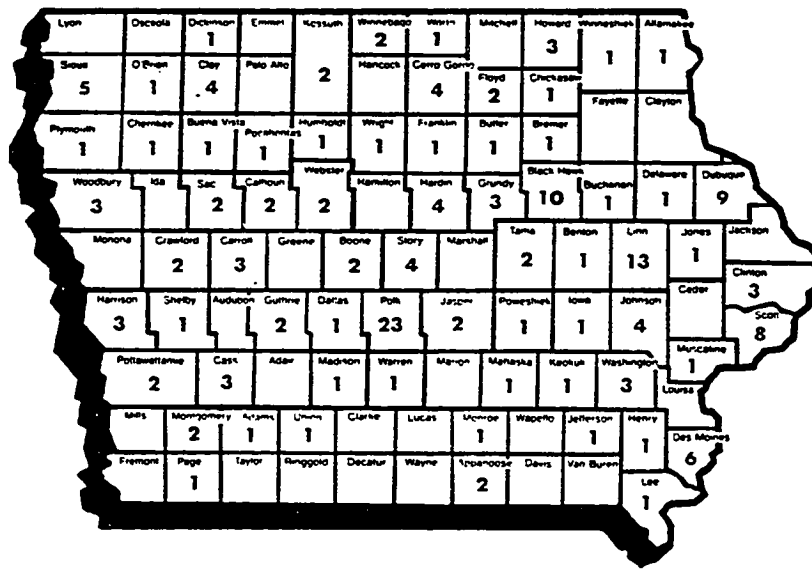


Figure 1. Geographic Distribution of Manufacturers who Returned Usable Questionnaires

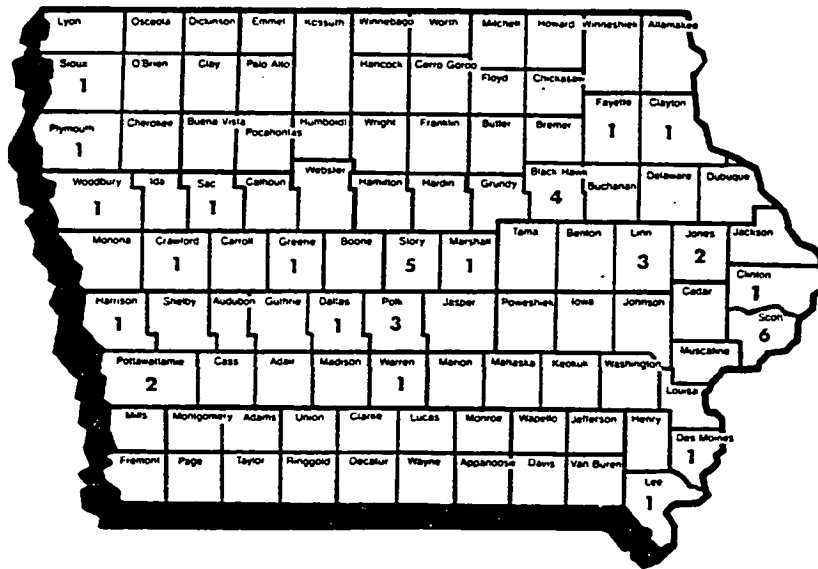


Figure 2. Geographic Distribution of Educators who Returned Usable Questionnaires



each of the identified factors. For objectives one, two, and four, the means between both sample groups were compared using a two-tailed t-test for independent means. Courtney and Sedgwick (1970) reported that "the student's 't' test . . . is appropriately used to determine if there is a significant difference between two sets of means" (Pkg. 1223, p. 3). Gay (1987) and Borg and Gall (1983) concurred. For objective three, the t-test for matched pairs was used to analyze data comparing opinions of manufacturers regarding the current and 5-year demand for personnel, and comparing the opinions of educators regarding the current and 5-year demand for personnel. Analyses of the data were performed through the usage of the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975) provided by the University of Northern Iowa Academic Computing Services.

Because hypotheses allow people to objectively approach a problem solution, hypotheses were stated so they could be tested. Since it was customary to set probability levels in advance of data collection so as not to bias the decision process, the alpha level of  $p < .05$  was established.

By stating hypotheses so they could be tested statistically, researchers could learn whether or not the differences between two means were due to chance variation or if they represented real differences which were not due to chance. Decisions about differences were made by comparing the computed t-value with the tabular t-value. Tabular values acted as the tolerance or comparison point for making decisions about the degree of trueness or falseness of the hypothesis. If the computed t-value was equal to or greater than the tabular t-value, the null

hypothesis was rejected, indicating that significant differences did exist between the perceptions of manufacturers and educators regarding the particular item described in the instrument. If however, the computed  $t$ -value was less than the tabular  $t$ -value, then the null hypothesis was not rejected, indicating there were no significant differences between the perceptions of both groups regarding a particular item.

Parts III and IV of the manufacturers' instrument involved the use of frequencies and percentages. Part IV also involved rankings. Part III of the educators' instrument involved frequencies and rankings. Some open-ended questions were also asked of the educators and after performing a content analysis, the data were reported in narrative form.

#### Perceived Demand for Personnel Iowa-Wide

Data regarding the perceived demand for personnel by manufacturers and educators were reported as related to the first three objectives. These objectives addressed the first nine hypotheses.

#### Perceived Current Demand

Objective one related to areas of agreement and disagreement concerning the current demand for skilled workers in selected production areas, management, and sales personnel in Iowa's graphic arts industry as perceived by manufacturers and educators. Significant differences did exist in 9 of 35 production areas and in one of three management areas. No significant differences were found in any of the two sales areas. Areas found to be significant include: illustrator, hot metal composition, strike-on composition, satellite telecommunications

operations, color scanner operations, lithography platemaking, screen process platemaking, and flexography platemaking operations, automated gathering/stitching/trimming operations, and personnel management.

Both groups are in complete agreement that the areas in the highest demand with means over 3.00 are production management and sales representative, even though significant differences were not indicated. With means of both groups indicated at 2.95 or higher, both groups agree that there is a high demand in the areas of phototypesetting, electronic image assembly, process color stripping, and lithography sheet all color printing over 17 x 22 size, even though significant differences were not found.

Although significant differences were indicated for hot metal composition and strike-on composition workers, the demand is low. Other areas low in demand are letterpress platemaking and letterpress printing. No significant differences were indicated, however, in these two areas.

In all of the cases above where significant differences were found, the means were highest for the educators' group as compared to the manufacturers' group indicating the educators perceived a higher demand for these employees. Although differences existed in the other 26 production areas, two management areas and two sales areas, these differences were not considered significant.

A listing of the results regarding the previous discussion and the t-test for independent means is found in Table 2. Frequencies and percentages are provided for each employee area.

Table 2

Means and "t"-Ratio Values Derived from Responses of  
Graphic Arts Manufacturers and Graphic Arts Educators  
Regarding the Perceived Current (1988) Demand for  
Skilled Workers in Selected Production Areas, and  
Management and Sales Personnel in the Graphic Arts  
Industry in Iowa

Item No.	Areas of Employee Functions	Frequency		Means		t- ratio
		M	E	M	E	
<b>Production Personnel</b>						
<b>Design and Layout</b>						
1.	Creative designer	179	39	2.83	2.97	-1.32
2.	Illustrator	177	39	2.59	2.90	-2.93 *
3.	Layout/copy mark-up	176	39	2.84	2.90	-0.54
4.	Copy writer	176	39	2.81	2.95	-1.22
5.	Photographer	179	39	2.70	2.87	-1.36
<b>Typesetting and Copy Preparation</b>						
6.	Hot Metal	175	39	1.63	2.00	-3.44 *
7.	Strike-on	169	38	1.84	2.21	-3.37 *
8.	Phototypesetting	176	39	2.98	3.10	-1.44
9.	Electronic image assembly	176	39	2.95	3.15	-1.56
10.	Satellite telecommunications	174	39	2.46	2.95	-3.56 *
11.	Editing/proofreading	177	39	2.80	3.00	-1.90
12.	Paste-up	177	39	2.89	2.79	0.90
<b>Prepress</b>						
13.	Black & white camera	173	40	2.92	2.90	0.24
14.	Process color camera	175	40	2.71	2.95	-1.97
15.	Color scanner	173	40	2.75	3.05	-2.54 *
16.	Black & white stripping	172	39	2.80	2.87	-0.65
17.	Process color stripping	171	39	2.96	3.18	-1.84
<b>Platemaking Operations</b>						
18.	Lithography	165	40	2.85	3.20	-3.11 *
19.	Letterpress	170	40	1.99	2.13	-1.16
20.	Screen process	170	40	2.57	2.83	-2.40 *
21.	Flexography	160	38	2.29	2.68	-3.28 *
22.	Gravure	159	38	2.27	2.47	-1.73
<b>Press Room</b>						
<b>Lithography</b>						
23.	Sheet (under 17 x 22)	165	40	2.93	3.08	-1.16
24.	Sheet b & w (over 17 x 22)	164	40	2.88	2.85	0.31
25.	Sheet all color (over 17 x 22)	165	40	2.98	3.20	-1.74
26.	Web, black & white	165	40	2.82	2.73	0.80

Table 2 (continued)

Item No.	Areas of Employee Functions	Frequency		Means		t-ratio
		M	E	M	E	
27.	Web, all color Other Processes	165	40	2.87	3.00	-1.01
28.	Letterpress	167	40	2.03	2.03	0.04
29.	Screen process	166	39	2.61	2.77	-1.35
30.	Flexography	157	38	2.42	2.63	-1.78
31.	Gravure	154	39	2.42	2.51	-0.75
<u>Binding/Finishing Operations</u>						
32.	Hand/small machines	168	38	2.46	2.63	-1.48
33.	Cutter	169	39	2.70	2.85	-1.18
34.	Folder	168	39	2.77	2.90	-1.06
35.	Automated gather/stitch/trim	168	39	2.74	3.03	-2.37 *
<u>Management Personnel</u>						
36.	Plant Administration	177	40	2.75	2.88	-1.24
37.	Production Management	178	40	3.02	3.03	-0.02
38.	Personnel Management	176	40	2.72	2.95	-2.09 *
<u>Sales Personnel</u>						
39.	Estimator	177	40	2.88	2.88	0.05
40.	Sales representative	178	40	3.13	3.00	1.21

Note. M = manufacturers; E = educators;  
\* $p < .05$ .

#### Perceived Future Demand

Objective two related to areas of agreement and disagreement concerning the future demand for skilled workers in selected production areas, management and sales personnel in Iowa's graphic arts industry as perceived by manufacturers and educators. Significant differences existed in 11 of 35 production areas and in one of three management areas. No significant differences were found in any of the two sales personnel areas.

The manufacturers and educators indicated significant differences for the following areas having means at 3.00 or higher: (a) electronic image assembly operations, (b) satellite telecommunications operations, (c) automated gathering and stitching and trimming operations, (d) lithography sheet all color printing over 17 x 22 size operations, and (e) personnel management. Other significant differences were found in the following areas although they were not rated at 3.00 or above for the future demand: (f) lithography platemaking, (g) screen process platemaking, (h) flexography platemaking, (i) screen printing, and (j) flexography printing. The following areas were rated high in demand although significant differences were not found. These areas were creative designer, process color stripping operations, color scanner, web-all color, plant administration, production management, estimator, and sales representative.

Other areas found significant but rated low in future demand were (k) hot metal composition and (l) strike-on composition. A low demand was indicated for letterpress printing and letterpress platemaking although the differences in perception were not found to be significant.

In each of the cases above and in 39 of 40 areas the means were highest for the educators' group as compared to the manufacturers' group. This indicates that educators as a group perceive a greater demand for graphic arts employees in the future.

A listing of the results regarding the previous discussion and the t-test for independent means is provided in Table 3. Also provided is a listing of frequencies for both groups.

Table 3

Means and "t"-Ratio Values Derived from Responses of  
Graphic Arts Manufacturers and Graphic Arts Educators  
Regarding the Perceived Demand in Five Years (1993)  
for Skilled Workers in Selected Production Areas,  
and Management and Sales Personnel in the Graphic  
Arts Industry in Iowa

Item No.	Areas of Employee Functions	Frequency		Means		t- ratio
		M	E	M	E	
<u>Production Personnel</u>						
<u>Design and Layout</u>						
1.	Creative designer	175	38	3.04	3.18	-1.18
2.	Illustrator	172	38	2.73	2.82	-0.69
3.	Layout/copy mark-up	172	38	2.90	3.00	-0.73
4.	Copy writer	173	38	2.92	2.97	-0.42
5.	Photographer	175	38	2.83	2.97	-1.05
<u>Typesetting and Copy Preparation</u>						
6.	Hot Metal	172	39	1.40	1.74	-2.98 *
7.	Strike-on	167	38	1.66	1.97	-2.50 *
8.	Phototypesetting	172	39	2.85	3.03	-1.21
9.	Electronic image assembly	172	39	3.51	3.82	-3.70 *
10.	Satellite telecommunications	171	39	3.16	3.67	-4.73 *
11.	Editing/proofreading	176	39	2.91	3.05	-1.17
12.	Paste-up	176	39	2.60	2.74	-1.02
<u>Prepress</u>						
13.	Black & white camera	167	40	2.83	2.80	0.23
14.	Process color camera	172	40	2.94	3.15	-1.45
15.	Color scanner	169	40	3.27	3.50	-1.80
16.	Black & white stripping	169	40	2.79	2.88	-0.68
17.	Process color stripping	167	40	3.22	3.45	-1.80
<u>Platemaking Operations</u>						
18.	Lithography	161	40	2.90	3.25	-2.74 *
19.	Letterpress	168	40	1.80	1.98	-1.33
20.	Screen process	164	40	2.66	3.08	-3.62 *
21.	Flexography	157	38	2.51	3.00	-3.71 *
22.	Gravure	157	38	2.43	2.63	-1.47
<u>Press Room</u>						
<u>Lithography</u>						
23.	Sheet (under 17 x 22)	165	40	2.92	3.10	-1.45
24.	Sheet b & w (over 17 x 22)	164	40	2.90	2.90	-0.03
25.	Sheet all color (over 17 x 22)	163	40	3.28	3.50	-2.20 *
26.	Web, black & white	165	40	2.88	2.85	0.27

Table 3 (continued)

Item No.	Areas of Employee Functions	Frequency		Means		t-ratio
		M	E	M	E	
27.	Web, all color Other Processes	164	40	3.20	3.43	-1.80
28.	Letterpress	166	40	1.87	1.93	-0.39
29.	Screen process	164	39	2.69	3.05	-2.87 *
30.	Flexography	157	38	2.56	2.97	-3.09 *
31.	Gravure	154	39	2.48	2.62	-1.01
<u>Binding/Finishing Operations</u>						
32.	Hand/small machines	166	39	2.44	2.54	-0.94
33.	Cutter	168	38	2.77	2.97	-1.54
34.	Folder	167	38	2.83	3.00	-1.25
35.	Automated gather/stitch/trim	168	39	3.05	3.38	-2.50 *
<u>Management Personnel</u>						
36.	Plant Administration	175	40	3.08	3.23	-1.18
37.	Production Management	176	40	3.31	3.45	-1.27
38.	Personnel Management	175	40	3.04	3.35	-2.42 *
<u>Sales Personnel</u>						
39.	Estimator	176	40	3.07	3.18	-0.80
40.	Sales representative	176	40	3.48	3.45	0.25

Note. M = manufacturers; E = educators;

\* $p < .05$ .

#### Comparison of Perceived Current and Future Demand

Objective three related to the comparison of current and future demand for skilled workers in selected production areas, and management and sales personnel in Iowa's graphic arts industry as perceived among the manufacturers' group and among the educators' group. The results were reported according to manufacturers' and educators' viewpoints.

Manufacturers' perceptions for production workers. The manufacturers' perceptions of differences between current and future



demand were significant in 27 of 35 production areas. Twenty of the 35 production areas reflected significant differences with a perceived increase in future demand.

In the design and layout section, these areas were indicated to be creative designer, illustrator, copy writer, and photographer. In the typesetting and copy preparation section, these production areas were identified as electronic image assembly, satellite telecommunications, and editing/proofing. In the prepress section, significant differences were found in process color operations, color scanner operations, process color stripping operations, and platemaking operations involving screen process, flexography, and gravure. In the pressroom section, significant differences were found between perceptions of current and future demands for each of the manufacturers' and educators' groups in lithography printing of all color sheet stock (over 17 x 22 size), web-all color, screen process printing, and flexography printing. In binding/finishing, significant differences in perceived demand for workers were found in cutter operations, folder operations, and automated gathering/stitching/trimming operations. In all areas above that were increasing in demand, the means were significantly higher for the educators' group as compared to the manufacturers' group.

Seven of the 35 production areas reflected significant differences with a perceived decrease in future demand. In the typesetting and copy preparation section, a decrease in demand for workers were indicated in hot metal composition, strike-on composition, phototypesetting, and paste-up. In the prepress section, a decrease in demand for black and white camera operations and letterpress platemaking operations were

perceived. In the pressroom, a decrease in letterpress printing operations was indicated.

Educators' perceptions for production workers. The educators' perception of differences between current and future demand were found to be significantly different in 15 of 35 production areas. Thirteen of the 35 production areas reflected significant differences with a perceived increase in future demand. These production areas included creative designer, electronic image assembly workers, satellite telecommunications operations, process color camera operations, color scanner operations, process color stripping, screen process platemaking operations, flexography platemaking operations, lithography printing of all color sheet stock (over 17 x 22 size), web-all color, screen process and flexography printing, and automated gathering/stitching/operations.

Two of the 35 production areas reflected significant differences with a perceived decrease in future demand. These production areas included hot metal composition and strike-on composition.

A listing of the results regarding the previous discussion and the t-test for matched pairs is found in Table 4. Production, management, and sales personnel data are listed in this table.

Significant differences were found in all three management areas. These areas were identified as plant administration, production management, and personnel management. The educators' means were significantly higher than the manufacturers' means for future demand in all three areas.

Significant differences were also found among the perceptions of manufacturers and educators in both sales areas. These areas were

Table 4

Means and "t"-Ratio Values Derived from Responses of  
Graphic Arts Manufacturers and Graphic Arts Educators  
Regarding the Perceived Current Demand (1988) and  
Demand in Five Years (1993) for Skilled Workers in  
Selected Production Areas, and Management and Sales  
Personnel in the Graphic Arts Industry in Iowa

Item No.	Areas of Employee Functions	f	Means		t-ratio
			Current (1988)	Five Years (1993)	
<b>Production Personnel</b>					
<b>Design and Layout</b>					
1.	Creative designer				
	Mfgs.	175	2.82	3.04	-5.18 *
	Educ.	38	2.97	3.18	-2.25 *
2.	Illustrator				
	Mfgs.	172	2.59	2.73	-3.30 *
	Educ.	38	2.89	2.82	1.00
3.	Layout/copy mark-up				
	Mfgs.	172	2.83	2.90	-1.80
	Educ.	38	2.89	3.00	-1.00
4.	Copy writer				
	Mfgs.	172	2.80	2.91	-2.89 *
	Educ.	38	2.95	2.97	-0.33
5.	Photographer				
	Mfgs.	175	2.70	2.83	-3.54 *
	Educ.	38	2.87	2.97	-1.43
<b>Typesetting and Copy Preparation</b>					
6.	Hot metal				
	Mfgs.	172	1.63	1.40	5.95 *
	Educ.	39	2.00	1.74	3.21 *
7.	Strike-on				
	Mfgs.	167	1.84	1.66	4.69 *
	Educ.	38	2.21	1.97	2.98 *
8.	Phototypesetting				
	Mfgs.	172	2.99	2.85	2.77 *
	Educ.	39	3.10	3.03	0.68
9.	Electronic image assembly				
	Mfgs.	171	2.96	3.51	-9.86 *
	Educ.	39	3.15	3.82	-5.94 *
10.	Satellite telecommu- nications				
	Mfgs.	171	2.47	3.16	-12.50 *
	Educ.	39	2.95	3.67	-6.53 *

Table 4 (continued)

Item No.	Areas of Employee Functions	f	Means		t-ratio
			Current (1988)	Five Years (1993)	
11.	Editing/proofreading				
	Mfgs.	175	2.80	2.90	-2.99 *
	Educ.	39	3.00	3.05	-0.57
12.	Paste-up				
	Mfgs.	175	2.89	2.59	6.25 *
	Educ.	39	2.79	2.74	0.40
Prepress					
13.	Black & white camera				
	Mfgs.	166	2.91	2.83	2.16 *
	Educ.	40	2.90	2.80	1.43
14.	Process color camera				
	Mfgs.	172	2.71	2.94	-4.19 *
	Educ.	40	2.95	3.15	-2.08 *
15.	Color scanner				
	Mfgs.	169	2.75	3.27	-10.95 *
	Educ.	40	3.05	3.50	-5.15 *
16.	Black & white stripping				
	Mfgs.	169	2.79	2.79	0.00
	Educ.	39	2.87	2.90	-0.33
17.	Process color stripping				
	Mfgs.	166	2.96	3.21	-5.00 *
	Educ.	39	3.18	3.46	-2.91 *
Platemaking Operations					
18.	Lithography				
	Mfgs.	161	2.84	2.90	-1.62
	Educ.	40	3.20	3.25	-0.81
19.	Letterpress				
	Mfgs.	167	2.00	1.80	4.94 *
	Educ.	40	2.13	1.98	1.52
20.	Screen process				
	Mfgs.	164	2.57	2.66	-3.10 *
	Educ.	40	2.83	3.08	-3.61 *
21.	Flexography				
	Mfgs.	157	2.30	2.51	-5.33 *
	Educ.	38	2.68	3.00	-4.13 *
22.	Gravure				
	Mfgs.	156	2.28	2.43	-3.87 *
	Educ.	38	2.47	2.63	-1.97

Table 4 (continued)

Item No.	Areas of Employee Functions	f	Means		t-ratio
			Current (1988)	Five Years (1993)	
Press Room Operations					
Lithography					
23.	Sheet (under 17 x 22)				
	Mfgs.	165	2.93	2.92	0.58
	Educ.	40	3.08	3.10	-0.30
24.	Sheet b & w (over 17 x 22)				
	Mfgs.	164	2.88	2.90	-0.38
	Educ.	40	2.85	2.90	-0.70
25.	Sheet all color (over 17 x 22)				
	Mfgs.	163	2.99	3.28	-6.95 *
	Educ.	40	3.20	3.50	-4.09 *
26.	Web, black & white				
	Mfgs.	164	2.82	2.89	-1.91
	Educ.	40	2.73	2.85	-1.40
27.	Web, all color				
	Mfgs.	163	2.87	3.20	-7.49 *
	Educ.	40	3.00	3.43	-4.52 *
Other Processes					
28.	Letterpress				
	Mfgs.	166	2.04	1.87	4.03 *
	Educ.	40	2.03	1.93	1.16
29.	Screen process				
	Mfgs.	164	2.60	2.69	-2.80 *
	Educ.	39	2.77	3.05	-3.86 *
30.	Flexography				
	Mfgs.	157	2.42	2.56	-4.08 *
	Educ.	38	2.63	2.97	-3.95 *
31.	Gravure				
	Mfgs.	154	2.42	2.48	-1.68
	Educ.	39	2.51	2.62	-1.43
Binding/Finishing Operations					
32.	Hand/small machines				
	Mfgs.	166	2.46	2.44	0.49
	Educ.	38	2.63	2.55	1.00
33.	Cutter				
	Mfgs.	168	2.70	2.77	-2.32 *
	Educ.	38	2.87	2.97	-1.67

Table 4 (continued)

Item No.	Areas of Employee Functions	f	Means		t-ratio
			Current (1988)	Five Years (1993)	
34.	Folder				
	Mfgs.	167	2.77	2.83	-2.23 *
	Educ.	38	2.92	3.00	-1.14
35.	Automated gather/ stitch/trim				
	Mfgs.	167	2.74	3.05	-7.50 *
	Educ.	39	3.03	3.38	-4.17 *
<u>Management Personnel</u>					
36.	Plant Administration				
	Mfgs.	175	2.74	3.08	-8.34 *
	Educ.	40	2.88	3.23	-3.82 *
37.	Production Management				
	Mfgs.	176	3.02	3.31	-7.21 *
	Educ.	40	3.03	3.45	-5.37 *
38.	Personnel Management				
	Mfgs.	174	2.71	3.04	-8.01 *
	Educ.	40	2.95	3.35	-3.57 *
<u>Sales Personnel</u>					
39.	Estimator				
	Mfgs.	176	2.88	3.07	-5.03 *
	Educ.	40	2.88	3.18	-4.09 *
40.	Sales representative				
	Mfgs.	176	3.12	3.48	-8.36 *
	Educ.	40	3.00	3.45	-4.20 *

Note. f = frequency; Mfgs. = manufacturers; Educ. = educators;  
\* $p < .05$ .

identified as estimator and sales representative personnel. The means for both areas were highest for the demand in five years.

#### Iowa Graphic Arts Issues and Questions

The next objective was related to areas of agreement and disagreement concerning selected issues regarding employment and related

factors in Iowa's graphic arts industry as perceived by manufacturers and educators. Means were compared as well as percentages.

### Selected Issues

Significant differences between the respondents were found in six of the 26 issues. These six issues were as follows:

When discussing the change in skill or technical knowledge required for the job today, as compared to the last five years (Fall 1983) for skilled production workers, significant differences were found in scanner separation operations and color proofing operations. The educators had the highest means indicating that they believed more skill/knowledge was required in the last five years for workers in these production areas as compared to the manufacturers.

When discussing whether or not personnel in the graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in educational institutions, significant differences were indicated in Iowa's high schools and vocational high schools. Educators indicated higher levels of agreement by virtue of their higher means.

A listing of the results including the t-test for independent means regarding the previous and following issues is found in Table 5. Frequencies are also reported.

Significant differences were found between the perceptions of manufacturers and educators when addressing the issues that personnel in the graphic arts industry should offer free training sessions to graphic arts educators to help upgrade their technical skills and knowledge, and whether or not personnel in the graphic arts industry should offer

Table 5

Means and "t"-Ratio Values Obtained from Responses of  
Graphic Arts Manufacturers and Graphic Arts Educators  
Concerning Selected Issues Regarding Employment and  
Other Factors in the Graphic Arts Industry in Iowa

Issue Statements	Frequency		Means		t- ratio
	M	E	M	E	
In the following areas has there been a Decrease, Little Change, or an Increase in skill or technical knowledge required for the job today, as compared to the last five years (Fall, 1983)?					
<u>Skilled Production Workers</u>					
1. Design and Layout	180	40	2.52	2.53	-0.03
2. Typesetting and Copy Prep. Pre-Press Operations	179	40	2.61	2.68	-0.62
3. Camera. b & w	180	39	2.11	2.13	-0.21
4. Camera, color separation	177	40	2.44	2.65	-1.93
5. Scanner separation	178	40	2.60	2.88	-4.06 *
6. Proofing, b & w	177	39	2.05	2.10	-0.76
7. Proofing, color	176	39	2.40	2.67	-2.89 *
8. Stripping/platemaking	176	40	2.29	2.43	-1.46
9. Pressroom	177	39	2.49	2.62	-1.31
10. Binding/Finishing	172	39	2.25	2.23	0.22
11. <u>Management Personnel</u>	178	40	2.54	2.63	-0.93
12. <u>Sales Personnel</u>	178	40	2.61	2.58	0.36
13. What affect will automation have on the number of skilled production workers?	169	38	1.79	1.87	-0.55
14. In Iowa's graphic arts industry, there is an adequate supply of skilled production workers.	181	39	2.15	2.26	-0.93
15. In Iowa's graphic arts industry, there is an adequate supply of management personnel.	180	39	2.55	2.46	0.82



Table 5 (continued)

Issue Statements	Frequency		Means		t-ratio
	M	E	M	E	
16. In Iowa's graphic arts industry, there is an adequate supply of sales personnel.	179	39	2.47	2.56	-0.85
17. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's high schools.	179	40	1.93	2.00	-0.50
18. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's vocational high schools.	178	39	2.60	2.59	0.04
19. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's post-secondary vocational/technical schools.	179	40	3.08	3.08	0.03
20. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's colleges and universities.	179	39	2.72	2.72	0.02
21. The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's high schools.	173	39	2.61	3.15	-3.70 *
22. The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's vocational high schls.	175	40	2.93	3.28	-2.63 *
23. The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's post-secondary vocational/technical schools.	180	40	3.23	3.40	-1.49

Table 5 (continued)

Issue Statements	Frequency		Means		t-ratio
	M	E	M	E	
24. The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's colleges/universities.	178	40	2.84	3.10	-1.79
25. The graphic arts industry should offer free training sessions to graphic arts educators to help upgrade their technical skills and knowledge.	181	39	3.04	3.77	-8.28 *
26. The graphic arts industry should offer internships to graphic arts students/educators interested in upgrading their skills and knowledge.	180	39	3.23	3.69	-4.77 *

Note. M = manufactueres; E = educators;  
\* $p < .05$ .

internships to graphic arts students/educators interested in upgrading their skills and knowledge. In perceiving these issues, the educators had the highest means which indicated greater levels of agreement.

Comparison of changes in skill/technical knowledge according to percentages. When evaluating twelve issue statements (Table N-1; Appendix N) regarding changes in skill and technical knowledge required for the job today as compared to the last five years (Fall 1983) in employee areas, over half (51%) of the manufacturers and educators (55%) indicated that skill/technical knowledge increased in 7 of 12 areas. These areas were design and layout, typesetting and copy preparation,

camera color separation, scanner separation, pressroom, management, and sales personnel.

In regards to color proofing, over half (56%) of the manufacturers indicated that little change occurred during this time period. However, two-thirds (67%) of the educators indicated an increase in skill/technical knowledge required in color proofing operations.

Respondents generally agreed that little change occurred in skill/technical knowledge during the last five years in the remaining four areas. These areas were: black and white camera operations, black and white proofing operations, stripping/platemaking operations, and binding/finishing operations.

Effects of automation on the number of skilled production workers.

In issue 13 (Table 6), when comparing the effects of automation on the need for skilled production workers as perceived by manufacturers and educators, two-fifths (40%) of the manufacturers indicated that fewer workers would be needed, while another two-fifths (40%) indicated that automation would have no effect on the number of workers needed. The educators were also indecisive. Less than half (45%) indicated that fewer workers would be needed, while a third (32%) indicated more workers would be needed because of automation.

Other issue statements. In the following tables where percentages are used, the percents have been calculated from frequencies and rounded to the nearest tenth of a percent. Because of this procedure, the numbers in the percent columns may not always total 100%.

Table 6

Comparison of the Effects of Automation on the Need for Skilled Production Workers as Perceived by Graphic Arts Manufacturers and Graphic Arts Educators in Iowa

Issue 13 Groups	Less Workers Needed		No Change		More Workers Needed		No Response
	f	%	f	%	f	%	f
Manufacturers	68	40.2	68	40.2	33	19.5	12
Educators	17	44.7	9	23.7	12	31.6	2

Note. f = frequency; % = percent.

In the following issue statements, the term "disagreed" will mean "disagree or strongly disagree." The term "agreed" will mean "agree or strongly agree." Data for the following issues are reported in Table 7.

In issue 14, three-fourths (73%) of the manufacturers disagreed with the statement that there is an adequate supply of skilled production workers in Iowa's graphic arts industry. Two-thirds (67%) of the educators also disagreed. Therefore, both groups indicated a shortage of skilled production workers in Iowa.

In issue 15, over half (57%) of the manufacturers agreed with the statement that there is an adequate supply of management personnel. However, half (54%) of the educators disagreed. Both groups were in disagreement on this issue.

When addressing the statement (issue 16) that there is an adequate supply of sales personnel in Iowa's graphic arts industry, half (50%) of

Table 7

Frequency and Percent of Responses of Graphic Arts  
Manufacturers and Graphic Arts Educators Concerning  
Selected Issues Regarding Employment and Other  
Factors in the Graphic Arts Industry in Iowa

Item No.	Issue Statements 14-26	Mfgs.		Educ.	
		f	%	f	%
14.	In Iowa's graphic arts industry, there is an adequate supply of skilled production workers.				
	Strongly Disagree	25	13.8	3	7.7
	Disagree	107	59.1	23	59.0
	Agree	46	25.4	13	33.3
	Strongly Agree	3	1.7	0	0.0
	No Response	0		1	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>
15.	In Iowa's graphic arts industry, there is an adequate supply of management personnel.				
	Strongly Disagree	7	3.9	1	2.6
	Disagree	71	39.4	20	51.3
	Agree	98	54.4	17	43.6
	Strongly Agree	4	2.2	1	2.6
	No Response	1		1	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>
16.	In Iowa's graphic arts industry, there is an adequate supply of sales personnel.				
	Strongly Disagree	7	3.9	0	0.0
	Disagree	83	46.4	18	46.2
	Agree	86	48.0	20	51.3
	Strongly Agree	3	1.7	1	2.5
	No Response	2		1	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>

Table 7 (continued)

Item No.	Issue Statements	Mfgs.		Educ.	
		f	%	f	%
17.	Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's high schools.				
	Strongly Disagree	51	28.5	13	32.5
	Disagree	92	51.4	16	40.0
	Agree	33	18.4	9	22.5
	Strongly Agree	3	1.7	2	5.0
	No Response	2		0	
	Total	181	100.0	40	100.0
18.	Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's vocational high schools.				
	Strongly Disagree	14	7.9	5	12.8
	Disagree	58	32.6	11	28.2
	Agree	92	51.7	18	46.2
	Strongly Agree	14	7.9	5	12.8
	No Response	3		1	
	Total	181	100.0	40	100.0
19.	Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's post-secondary vocational/technical schools.				
	Strongly Disagree	4	2.2	0	0.0
	Disagree	25	14.0	7	17.5
	Agree	103	57.5	23	57.5
	Strongly Agree	47	26.3	10	25.0
	No Response	2		0	
	Total	181	100.0	40	100.0

Table 7 (continued)

Item No.	Issue Statements	Mfgs.		Educ.	
		f	%	f	%
20.	Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts education programs in Iowa's colleges and universities.				
	Strongly Disagree	15	8.4	3	7.7
	Disagree	46	25.7	12	30.8
	Agree	92	51.4	17	43.6
	Strongly Agree	26	14.5	7	17.9
	No Response	2		1	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>
21.	The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's high schools.				
	Strongly Disagree	17	9.8	1	2.6
	Disagree	59	34.1	5	12.8
	Agree	72	41.6	20	51.3
	Strongly Agree	25	14.5	13	33.3
	No Response	8		1	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>
22.	The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's vocational high schls.				
	Strongly Disagree	9	5.1	0	0.0
	Disagree	32	18.3	5	12.5
	Agree	97	55.4	19	47.5
	Strongly Agree	37	21.1	16	40.0
	No Response	6		0	
	<b>Total</b>	<b>181</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>

Table 7 (continued)

Item No.	Issue Statements	Mfgs.		Educ.	
		F	%	F	%
23.	The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's post-secondary vocational/technical schools.				
	Strongly Disagree	3	1.7	0	0.0
	Disagree	15	8.3	3	7.5
	Agree	100	55.6	18	45.0
	Strongly Agree	62	34.4	19	47.5
	No Response	1		0	
	Total	181	100.0	40	100.0
24.	The graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in Iowa's colleges/universities.				
	Strongly Disagree	12	6.7	1	2.5
	Disagree	43	24.2	5	12.5
	Agree	84	47.2	23	57.5
	Strongly Agree	39	21.9	11	27.5
	No Response	3		0	
	Total	181	100.0	40	100.0
25.	The graphic arts industry should offer free training sessions to graphic arts educators to help upgrade their technical skills and knowledge.				
	Strongly Disagree	6	3.3	0	0.0
	Disagree	27	14.9	0	0.0
	Agree	101	55.8	9	23.1
	Strongly Agree	47	26.0	30	76.9
	No Response	0		1	
	Total	181	100.0	40	100.0



Table 7 (continued)

Item No.	Issue Statements	Mfgs.		Educ.	
		f	%	f	%
26.	The graphic arts industry should offer internships to graphic arts students/educators interested in upgrading their skills/knowledge				
	Strongly Disagree	2	1.1	0	0.0
	Disagree	7	3.9	0	0.0
	Agree	119	66.1	12	30.8
	Strongly Agree	52	28.9	27	69.2
	No Response	1		1	
	Total	181	100.0	40	100.0

Note. Mfgs. = manufacturers; Educ. = educators; f = frequency; % = percent.

the manufacturers disagreed, while the other half agreed with this statement. While 46% of the educators disagreed, 54% of them believed there is an adequate supply of sales personnel. There is no consensus of opinion between both groups regarding this issue.

The central theme of issues 17 through 20 focus on the topic of whether tomorrow's needs of Iowa's graphic arts industry will be met by various levels of graphic arts programs. Over three quarters (80%) of the manufacturers and three quarters (73%) of the educators perceived that Iowa's graphic arts industry needs will not be met by today's high school graphic arts education programs. Almost two-thirds (60%) of the manufacturers and educators (59%) agreed that vocational high school graphic arts programs were perceived to be meeting tomorrow's needs of

the industry. Over three-fourths (84%) of the manufacturers and educators (83%) agreed that vocational/technical school graphic arts programs seemed to be doing an adequate job in meeting tomorrow's needs of the industry. Two-thirds (66%) of the manufacturers and educators (62%) agreed that the college/university graphic arts programs were perceived to be meeting tomorrow's needs of the industry.

The central theme regarding issues 21 through 24 refers to whether or not personnel in the graphic arts industry should set aside funds to be used to upgrade graphic arts equipment in various levels of graphic arts programs. Over half (56%) of the manufacturers and 85% of the educators agreed that funds from personnel in the graphic arts industry should be used to upgrade graphic arts equipment in Iowa's high schools. Three-fourths (77%) of the manufacturers and 88% of the educators agreed that these funds should be directed towards vocational high school programs. Ninety percent of the manufacturers and 93% of the educators agreed that the funds should be used for post-secondary vocational/technical schools. Over two thirds (69%) of the manufacturers and 85% of the educators agreed that the funds should be directed towards updating equipment in graphic arts programs in Iowa's colleges/universities.

When comparing the results of issues 21 through 24, it was generally perceived that the graphic arts industry should set aside funds to be used for upgrading equipment in graphic arts educational laboratories. In rank order, these are: (1) post-secondary vocational/technical institutes, (2) vocational high schools, (3) colleges/universities, and (4) high schools.

The manufacturers and educators strongly agreed that personnel in the graphic arts industry should offer free training sessions to educators. Over three-fourths (82%) of the manufacturers and all of the educators agreed. Ninety-five percent of the manufacturers and all of the educators agreed that internships should also be offered to graphic arts students/educators interested in upgrading their skills/knowledge.

#### Actual Demand for Personnel at Plant Sites

The statements from manufacturers regarding the current and five year demand for skilled production workers, management, and sales personnel, are related to objective five. Manufacturers indicated the following needs for employees:

#### Current and Future Demand

Considering current demand and probable demand in five years, the manufacturers were asked to indicate the demand for skilled workers, management, and sales personnel at their plant sites. The manufacturers were told that the numbers they provide should NOT reflect the numbers of workers presently employed at their plant sites. The numbers should reflect anticipated changes in the number of workers needed.

Greatest demand for skilled production workers. In the following paragraphs that follow indicating two numbers separated by a hyphen, the first number represents the highest current demand and the second number represents the future demand. According to the manufacturers, the paste-up personnel group was indicated as being in greatest demand with 242-286 skilled workers. Other top production areas in demand were phototypesetting operations (155-206), layout/copy mark-up (146-207),

editing/proofreading operations (146-200), black and white camera operations (118-157), creative designer operations (117-201), lithography sheet press operators for presses under 17 x 22 size (114-181), and electronic image assembly operations, with a current demand of 103 and a future demand of 244.

Production areas with the greatest percent of increase. The following groups of three numbers reflect a range for the current through future demand followed by the percentage of increase for this time period. The areas which were anticipated to have the greatest increase from current to future demand were identified as satellite telecommunications operations (4-36; 800%), gravure press operations (1-5; 400%), flexography platemaking operations (7-25; 257%), and gravure platemaking operations (1-3; 200%). Other areas were identified as automated gathering/stitching/trimming operations (32-86; 169%), screen process press operations (19-50; 163%), electronic image assembly operations (103-244; 137%), hand/small machine operations (86-196; 128%), color scanner operations (27-58; 115%), process color camera operations (21-42; 100%), and flexography press operations (18-36; 100%).

Hot metal composition was the only production area which showed a decline in the demand for employees. With a current demand of 16 and a future demand of 14 workers, a decrease of 13% was indicated for this area.

In all 35 production areas, a current demand of 2,322 skilled workers was indicated and the future demand in five years was for 3,648 workers. This represented an increase of 57%.

Demand for management and sales personnel. The demand for management personnel as indicated by manufacturers currently and in five years are listed as follows: plant administration personnel (128-185; 45%), production management personnel (119-186; 56%), and personnel managers (66-97; 47%). In all three management areas, the current demand was for 313 personnel and a future need for 468, for an increase of 50%.

The current and future demand for sales personnel as indicated by manufacturers at their plant sites were that sales representatives were perceived to be in great demand with 205 currently needed and 337 needed in five years, for an increase of 64%. The current demand for estimators was reported to be 85 while the demand in five years was reported to be 122, an increase of 44%. In both areas a current demand for 290 sales personnel and a five year demand of 459 was indicated, an increase of 58%. The total current demand is for 2,925 production, management, and sales personnel. The future demand is for 4,575 employees, a difference of 1,650 employees.

A listing of the data regarding the previous discussion of the actual current and future demand for employees are found in Table 8. The demand for employees is reported in three separate job categories.

#### Company Characteristics and Employment Practices

Certain information related to demographic characteristics and employment practices can be utilized to obtain a more accurate description of an industry. Statements in this section are related to objective six.

Table 8

Responses from the Iowa Graphic Arts Manufacturers  
Regarding the Number of Skilled Workers in Selected  
Production Areas, and Management and Sales Personnel  
Perceived as Needed in their Operations Currently  
(1988) and in Five Years (1993)

Areas of Employee Functions	Current Demand	Demand in 5 Years	Total Change	Percent of Change
<u>Production Personnel</u>				
<u>Design and Layout</u>				
1. Creative designer	117	201	84	71.8
2. Illustrator	61	95	34	55.7
3. Layout/copy mark-up	146	207	61	41.8
4. Copy writer	88	120	32	36.4
5. Photographer	85	122	37	43.5
<u>Typesetting and Copy Prep.</u>				
6. Hot metal	16	14	-2	-12.5
7. Strike-on	14	16	2	14.3
8. Phototypesetting	155	206	51	32.9
9. Electronic image assembly	103	244	141	136.9
10. Satellite telecomm.	4	36	32	800.0
11. Editing/proofreading	146	200	54	37.0
12. Paste-up	242	286	44	18.2
<u>Prepress</u>				
13. Black & white camera	118	157	39	33.1
14. Process color camera	21	42	21	100.0
15. Color scanner	27	58	31	114.8
16. Black & white stripping	93	133	40	43.0

Table 8 (continued)

Areas of Employee Functions	Current Demand	Demand in 5 Years	Total Change	Percent of Change
17. Process color stripping	74	126	52	70.3
Platemaking Operations				
18. Lithography	81	118	37	45.7
19. Letterpress	33	38	5	15.2
20. Screen process	21	39	18	85.7
21. Flexography	7	25	18	257.1
22. Gravure	1	3	2	200.0
Press Room				
Lithography				
23. Sheet (under 17 x 22)	114	181	67	58.8
24. Sheet b & w (over 17 x 22)	48	84	36	75.0
25. Sheet all color (over 17 x 22)	47	93	46	97.9
26. Web, black & white	38	59	21	55.3
27. Web, all color	61	78	17	27.9
Other Processes				
28. Letterpress	45	63	18	40.0
29. Screen process	19	50	31	163.2
30. Flexography	18	36	18	100.0
31. Gravure	1	5	4	400.0
Binding/Finishing Operations				
32. Hand/small machines	86	196	110	127.9
33. Cutter	84	120	36	42.9

Table 8 (continued)

Areas of Employee Functions	Current Demand	Demand in 5 Years	Total Change	Percent of Change
34. Folder	76	111	35	46.1
35. Automated gathering/ stitching/trimming	32	86	54	168.8
<u>Management Personnel</u>				
36. Plant Administration	128	185	57	44.5
37. Production Management	119	186	67	56.3
38. Personnel Management	66	97	31	47.0
<u>Sales Personnel</u>				
39. Estimator	85	122	37	44.4
40. Sales representative	205	337	132	64.4
<u>Production Personnel:</u>	2,322	3,648	1,326	57.1
<u>Management Personnel:</u>	313	468	155	49.5
<u>Sales Personnel:</u>	290	459	169	58.3
Totals*	2,925	4,575	1,650	56.4

Note. \* = Totals only represent the demand stated by those responding.

#### Characteristics of Graphic Arts Manufacturers

Manufacturers were asked for information needed to identify selected characteristics of their companies and answer questions related to employment practices. These questions were as follows:

Desired educational level of new employees. In question one, manufacturers were asked to indicate the desired educational attainment levels for entry level skilled production workers in 10 job categories,



and management and sales personnel. For skilled production workers, manufacturers want new employees to have a variety of educational backgrounds. For layout and design workers, a third (34%) of the manufacturers indicated an educational background at the vocational/technical institute level. However, another third (35%) of the manufacturers desire a community college or college/university education for these layout and design employees.

In the typesetting and copy preparation area, over a third (36%) of the manufacturers desire workers with experience at the vocational/technical institute while about a third (30%) desire a general high school background. Two-fifths of the manufacturers prefer that their employees have a community college level preparation.

In the prepress area of black and white camera operations, slightly less than half (46%) of the manufacturers desire a vocational/technical institute level of experience while 24% desire a general high school experience. For camera color separation workers, half (52%) of the manufacturers desire vocational/technical institute experiences, followed by over a fourth (28%) of the manufacturers who desire a two-year community college background. Close to half (45%) of the manufacturers desire a vocational/technical institute program for scanner separation workers while 30% of the manufacturers desire a two-year community college experience. Two-fifths (42%) of the manufacturers desire black and white proofing operators to have vocational/technical institute experience while over a fourth (29%) of the manufacturers want these employees to have a general high school background. For color proofing personnel, almost half (46%) of the

manufacturers seek workers with a vocational/technical institute experience, while a fifth (21%) accept a general high school graduate. For stripping/platemaking personnel, almost half (48%) of the manufacturers desire a vocational/technical institute experience while one fourth (25%) are satisfied with a general high school graduate.

For pressroom personnel, 46% of the manufacturers desire vocational/technical institute experience while over one fourth (27%) desire a general high school experience. For binding/finishing personnel, 43% of the manufacturers want their workers to have a high school diploma while over one fourth (27%) desire vocational/technical institute experience.

Over half (58%) of the manufacturers want their managers to have a four-year college/university education while over a fourth (29%) desire a two-year community college education. For sales personnel, 44% of the manufacturers want their sales people to have a two-year community college education while a third (33%) seek sales people with at least a four-year college/university education.

Generally, a vocational/technical or high school level of experience is desired for most production areas. In the production areas of layout and design, and color separation work, 24% and 28% of the manufacturers, respectively, desire workers with at least a community college degree. Manufacturers desire management and sales personnel to have a community college or a four year college/university degree.

Frequencies and percentages regarding the desired educational level of new employees are found in Table 9. The data are as follows:

Table 9

Frequency and Percent of Desired Educational Level  
of New Employees by Job Categories as Perceived by  
Graphic Arts Manufacturers

Job Categories	Desired Educ. Level	
	f	%
<u>Skilled Production Workers</u>		
1. Layout and design:		
Less than high school	0	0.0
General high school	28	16.5
Vocational high school	25	14.7
Voc/Tech Institute	58	34.1
2-Yr. Community college	40	23.5
4-Yr. College/university	19	11.2
No response	11	
<b>Total</b>	<b>181</b>	<b>100.0</b>
2. Typesetting and copy preparation:		
Less than high school	0	0.0
General high school	51	30.2
Vocational high school	20	11.8
Voc/Tech Institute	60	35.5
2-Yr. Community college	33	19.5
4-Yr. College/university	5	3.0
No response	12	
<b>Total</b>	<b>181</b>	<b>100.0</b>
Pre-press operations:		
3. Camera, black & white		
Less than high school	0	0.0
General high school	39	24.1
Vocational high school	28	17.3
Voc/Tech Institute	74	45.7
2-Yr. Community college	20	12.3
4-Yr. College/university	1	0.6
No response	19	
<b>Total</b>	<b>181</b>	<b>100.0</b>

Table 9 (continued)

Job Categories	Desired Educ. Level	
	f	%
<b>4. Camera, color separation:</b>		
Less than high school	0	0.0
General high school	16	11.6
Vocational high school	10	7.2
Voc/Tech Institute	72	52.2
2-Yr. Community college	38	27.5
4-Yr. College/university	2	1.4
No response	43	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>5. Scanner separation:</b>		
Less than high school	0	0.0
General high school	17	12.6
Vocational high school	12	8.9
Voc/Tech Institute	61	45.2
2-Yr. Community college	40	29.6
4-Yr. College/university	5	3.7
No response	46	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>6. Proofing, black &amp; white:</b>		
Less than high school	0	0.0
General high school	41	28.7
Vocational high school	21	14.7
Voc/Tech Institute	60	42.0
2-Yr. Community college	18	12.6
4-Yr. College/university	3	2.1
No response	38	
<b>Total</b>	<b>181</b>	<b>100.0</b>

Table 9 (continued)

Job Categories	Desired Educ. Level	
	f	%
<b>7. Proofing, color:</b>		
Less than high school	0	0.0
General high school	29	21.2
Vocational high school	20	14.6
Voc/Tech Institute	63	46.0
2-Yr. Community college	23	16.8
4-Yr. College/university	2	1.5
No response	44	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>8. Stripping/platemaking:</b>		
Less than high school	1	0.7
General high school	38	25.2
Vocational high school	22	14.6
Voc/Tech Institute	72	47.7
2-Yr. Community college	18	11.9
4-Yr. College/university	0	0.0
No response	30	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>9. Pressroom operations:</b>		
Less than high school	0	0.0
General high school	44	27.2
Vocational high school	23	14.2
Voc/Tech Institute	74	45.7
2-Yr. Community college	21	13.0
4-Yr. College/university	0	0.0
No response	19	
<b>Total</b>	<b>181</b>	<b>100.0</b>

Table 9 (continued)

Job Categories	Desired Educ. Level	
	f	%
<b>10. Binding and finishing:</b>		
Less than high school	2	1.4
General high school	63	42.6
Vocational high school	31	20.9
Voc/Tech Institute	40	27.0
2-Yr. Community college	12	8.1
4-Yr. College/university	0	0.0
No response	33	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>11. Management personnel:</b>		
Less than high school	0	0.0
General high school	6	3.6
Vocational high school	5	3.0
Voc/Tech Institute	12	7.1
2-Yr. Community college	48	28.6
4-Yr. College/university	97	57.7
No response	13	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>12. Sales personnel:</b>		
Less than high school	0	0.0
General high school	12	7.1
Vocational high school	8	4.7
Voc/Tech Institute	18	10.7
2-Yr. Community college	75	44.4
4-Yr. College/university	56	33.1
No response	12	
<b>Total</b>	<b>181</b>	<b>100.0</b>

Note. f = frequency; % = percent.

Preferred sources of personnel. In question two, manufacturers were asked to indicate their preferred sources of skilled production workers, management personnel, and sales personnel. For skilled production workers, almost half (45%) of the manufacturers prefer their workers to advance within the company while over a fourth (27%) seek new employees from vocational high schools. Other sources included advertisements, apprenticeship, and on the job training of high school graduates. One-third (34%) of the manufacturers prefer to obtain management personnel through advancement within the company. However, almost a third (31%) of the manufacturers prefer new managers from four-year college/university programs.

Over one-fourth (27%) of the manufacturers prefer their sales personnel to advance within the company, about one fourth (24%) prefer their new sales personnel to come from two-year community colleges; about one fourth (23%) prefer their employees to come from four-year colleges/universities; 20% seek sales personnel from other companies. Two manufacturers listed "other" sources for securing management and sales personnel. The information, however, provided by the respondents was not well defined, therefore, these sources were not reported.

Data regarding the preferred sources of personnel are found in Table 10. The data are reported by frequencies and percentages.

Desired hiring characteristics. In question three, manufacturers were asked to indicate the three most important characteristics sought when hiring skilled workers and management and sales personnel. The data are reported in Table N-2. Since there was a great variation in frequencies, all ranks were established according to frequencies.

Table 10

Frequency and Percent of Preferred Sources of  
New Employees by Job Categories as Perceived  
by Graphic Arts Manufacturers

Job Categories	Preferred Sources of New Employees	
	f	%
<b>1. Skilled Production Workers:</b>		
Advance within company	80	45.2
Other companies	25	14.1
Vocational high school	47	26.6
2-Yr. Community college	17	9.6
4-Yr. College/university	5	2.8
Other*	3	1.7
No response	4	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>2. Management personnel:</b>		
Advance within company	60	34.3
Other companies	27	15.4
Vocational high school	6	3.4
2-Yr. Community college	25	14.3
4-Yr. College/university	55	31.4
Other*	2	1.1
No response	6	
<b>Total</b>	<b>181</b>	<b>100.0</b>
<b>3. Sales personnel:</b>		
Advance within company	47	26.7
Other companies	35	19.9
Vocational high school	10	5.7
2-Yr. Community college	42	23.9
4-Yr. College/university	40	22.7
Other*	2	1.1
No response	5	
<b>Total</b>	<b>181</b>	<b>100.0</b>

**Note.** f = frequency, % = percent; \* = other sources not listed.



For skilled production workers, the three most important hiring characteristics in ranked order were (1) attitude/work habits, (2) technical knowledge/skills, and (3) willingness to improve job skills/work knowledge. For both management and sales personnel, the three most important hiring characteristics in ranked order were (1) ability to communicate, (2) ambition and initiative, and (3) attitude/work habits.

Problems in retention of personnel. The four most important problems indicated by manufacturers in the retention of employees regarding skilled, management, and sales personnel are reported in Table N-3. Since there was a small variation in the frequencies of respondents, all ranks were established according to means with rank 1 representing the lowest mean and rank 4 representing the highest mean. These were ranked: (1) poor knowledge/skill ability, (2) unable to get along, (3) unable to adapt to retraining, and (4) poor wage scale compared with other industries/businesses. For management and sales personnel, the problems were ranked as: (1) poor knowledge/skill ability, (2) unable to get along, (3) poor wage scale compared with other industries/businesses, and (4) unable to adapt to retraining.

Number of employees. The numbers of employees at plant sites as reported by the manufacturers are listed in Table 11. Half the manufacturers participating in the study indicated that 10 or fewer workers were employed and two-thirds (67%) employed 20 or fewer workers.

Printing processes used. When asked to indicate the percentage of production time devoted to each printing process at their location, manufacturers provided data which are found in Table 12. The

Table 11

Frequency and Percent of Graphic Arts  
Personnel Employed in Iowa's Graphic  
Arts Industry as Reported by Iowa  
Manufacturers who Returned  
Usable Opinionnaires

Number of Employees	Respondents	
	f	%
1--10	88	49.7
11--20	30	16.9
21--50	32	18.1
51--100	16	9.0
101--250	4	2.3
251--500	5	2.8
501--1000	1	0.6
1001 +	1	0.6
No response	4	
Total	181	100.0

Note. f = frequency; % = percent; N = 181.

manufacturers were also asked to indicate if the percentage of use had decreased, not changed, or increased since the Fall of 1983. Data for this last question were reported in Table N-4.

Because some graphic arts manufacturers used more than one printing process, the total percentages do not add up to 100%. Of the manufacturers who returned usable opinionnaires, over three-fourths

Table 12

Frequency and Percent of Iowa Graphic Arts  
Manufacturers who Use Various Printing  
Processes

Printing Processes	Manufacturers Reporting		Production Time Used
	f	%	Mean %
1. Lithography	141	77.9	86.4
2. Letterpress	69	38.1	16.1
3. Screen process	20	11.0	48.6
4. Flexography	5	2.8	45.6
5. Gravure	2	1.1	26.0
6. Letterset	10	5.5	16.1
7. Electrostatic	24	13.3	27.7
8. Other*	6	3.3	38.2

Note. f = frequency, % = percent; \* = other processes used; N = 181. Some companies used more than one process.

(78%) reported using the lithography printing process 86% of the time and over a third (38%) reported using the letterpress process 16% of the time. Eleven percent of the manufacturers reported using the screen printing process half (49%) of the time. Thirteen percent of the manufacturers reported using the electrostatic printing process over a fourth (29%) of the time. Flexography, gravure, and letterset printing processes were not used by many Iowa manufacturers during this time period. Although other processes were reported by the manufacturers

(item 8), they were not considered true printing processes. These "processes" were reported as embossing, typesetting, business forms, web, newspaper, etc.

Manufacturers reported the percent of change in the use of printing processes during the last five years. Not all manufacturers completed both parts of the question related to printing processes used and changes which took place. During the past five years the majority of manufacturers indicated an increase in the percentage of lithography (53%), and electrostatic (56%) printing processes used. A 48% decrease in letterpress printing was reported. No change or a slight decrease in the use of other printing processes was indicated.

Comments from manufacturers. Selected comments from manufacturers are presented in Appendix O. The comments are grouped under four categories including the importance of the study, other factors relating to the study, the need for skilled workers, and technological change and the need for education and training.

#### Characteristics of Educators, their Activities, and Programs

Certain information related to demographic characteristics of graphic arts educators, their activities, and programs provide the reader with greater insight as to how graphic arts educators function in their institutional environment. Statements in this section are related to objective seven.

#### Characteristics of Educators

Graphic arts educators were asked for information needed to identify selected characteristics related to themselves, their

professional development activities, and their graphic arts programs.

These questions were as follows:

Age of respondents. Question one referred to the educator's age. The data for this question are indicated in Table N-5. Since their last birthday, half (50%) of the educators were between the ages of 35-44 and 15% of them were at least 55 years of age and approaching retirement.

Highest level of educational attainment. In question two the educators were asked to indicate their highest level of educational attainment. Table N-6 includes a listing of the data for this question. While almost half (48%) of the educators had an earned baccalaureate degree, one fourth (25%) had a master's degree, and 13% had a doctoral degree.

Where employed. In question three, the educators were asked to indicate the type of institution employed at. Over half (54%) of the respondents taught at the high school level and one-fifth (21%) taught at a four-year college/university as reported in Table 13.

Years of graphic arts and total teaching. In question four, educators were asked to indicate how many years they had taught graphic arts and taught totally prior to the 1988-89 school year. As indicated in Tables N-7 and N-8, one-third (34%) of the educators taught graphic arts from 1-4 years; one-fifth (21%) taught 5-9 years and one-fourth (24%) taught 10-14 years. The mean for teaching graphic arts was 9.1 years and the median was 7.5 years. Considering total years of teaching, the respondents had a mean of 13.0 years and a median of 11.0 years.

Table 13

Frequency and Percent Distribution of Iowa  
Graphic Arts Educators Employed at Various  
Types of Institutions

Type of Institution	f	%
1. General high school (grades 9, 10, 11, or 12)	21	53.8
2. Vocational high school (grades 9, 10, 11, or 12)	4	10.3
3. Vocational/technical institute	0	0.0
4. 2-Year community college	4	10.3
5. 4-Year college/university	8	20.5
6. Other*	2	5.1
7. No response	1	
Total	40	100.0

Note. f = frequency; % = percent; \* = other institutions (on the job training at a prison, and job core center).

Industrial work experience. The educators were asked to indicate if they had any graphic arts related industry experience (full or part-time) and to indicate how many years. The data for this question are located in Table N-9. Of the 21 graphic arts educators who had some graphic arts work experience, almost half (45%) of them worked from one to two years. The mean was 10.4 years while the median was 4.0 years.

Methods used to keep up to date in graphic arts. In question six the educators were asked to rank the top three most important methods used during the past two years to keep current within the graphic arts field. In ranked order, as indicated in Table N-10, educators used the following methods to keep pace with developments in the graphic arts field: (1-2) seminars/workshops/in-service training, (1-2) trade journals/magazines, (3) vendor/technical representative contacts, (4-5) attending conference/trade exhibits, and (4-5) participating in field trips.

Emphasis of job opportunities. In question seven, the educators were asked to indicate their degree of teaching emphasis regarding the topic of graphic arts employment opportunities for skilled production workers, management personnel, and sales personnel. The data are reported in Table 14. Generally, job opportunities for skilled production workers received average coverage according to half (53%) of the educators and considerable coverage by over a fourth (28%) of the educators. When discussing job opportunities for management personnel, almost half (45%) of the educators provided average coverage and a third (33%) mentioned job opportunities briefly. When discussing job opportunities for sales personnel, 43% of the educators provided average coverage while 43% mentioned job opportunities briefly. Thirteen percent of the educators did not mention job opportunities for sales personnel at all.

Curricula updating. In question eight the educators were asked to indicate how often they updated their graphic arts curriculum. Forty percent of the educators updated their curriculum each year while 40%

updated it every three to five years. This information is reported in the Appendix in Table N-11.

Table 14

Frequency and Percent of the Degree that Job Opportunities are Emphasized by Iowa Graphic Arts Educators when Discussing Employee Groups with Students

Employee Groups	None	Mentioned Briefly	Average Coverage	Considerable Coverage
1. Skilled production workers				
f	2	6	21	11
%	5.0	15.0	52.5	27.5
2. Management personnel				
f	4	13	18	5
%	10.0	32.5	45.0	12.5
3. Sales personnel				
f	5	17	17	1
%	12.5	42.5	42.5	2.5

Note. f = frequency; % = percent; N = 40.

Student enrollment. In question nine, the educators were asked to indicate the effect on student enrollment in graphic arts in the past three years. While the majority of them (41%) indicated that their enrollment did not change, one fourth (26%) indicated an increase in graphic arts enrollment and a third (33%) indicated a decrease. This is reported in Table N-12.

Degree of support. In question ten three levels of graphic arts educators were asked to indicate the degree of graphic arts program



support they received from various individuals at their institutions. Twenty-five high school educators responded. Almost half (48%) of them received little support from high school counselors while over a third (36%) received moderate support. Two-fifths (40%) of the educators received little support from the principal/assistant principal while over a third (36%) received moderate support. Over three fourths (84%) of the graphic arts educators received moderate to high support from fellow technology education teachers. Over two-fifths (44%) of the educators received moderate support from fellow teachers of other disciplines while over a third (36%) received little support. In regards to support from board of education members, over half (56%) of the graphic arts educators received little or no support and one fourth (24%) received moderate support. With regards to the school superintendent, over half (52%) of the educators received little or no support and 16% received moderate support. A third (32%) of the educators indicated they received little support from the general public while a fourth (24%) indicated they received moderate support.

The majority (over 50%) of the educators received moderate to high support from their principals/assistant principals and fellow technology education teachers. The majority of graphic arts educators, however, received little or no support from the other groups.

Data regarding the degree of support for high school educators are found in Table 15. The data are reported by frequencies and percents.

Two post-secondary vocational/technical educators also provided data. Both educators indicated receiving moderate support from department colleagues, little support from department heads, and

Table 15

Frequency and Percent of General Degree of Support for Iowa Graphic Arts Programs by Secondary School Educators

Secondary Educators	f	%
<b>1. Guidance counselors</b>		
Don't Know	1	4.0
None	1	4.0
Little	12	48.0
Moderate	9	36.0
High	2	8.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>2. Principal/assistant principal</b>		
Don't Know	1	4.0
None	1	4.0
Little	10	40.0
Moderate	9	36.0
High	4	16.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>3. Fellow technology education teachers</b>		
Don't Know	1	4.0
None	1	4.0
Little	2	8.0
Moderate	14	56.0
High	7	28.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>

Table 15 (continued)

Secondary Educators	f	%
<b>4. Fellow teachers of other disciplines</b>		
Don't Know	0	0.0
None	5	20.0
Little	9	36.0
Moderate	11	44.0
High	0	0.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>5. Board of education members</b>		
Don't Know	5	20.0
None	6	24.0
Little	8	32.0
Moderate	6	24.0
High	0	0.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>6. School superintendent</b>		
Don't Know	7	28.0
None	5	20.0
Little	8	32.0
Moderate	4	16.0
High	1	4.0
No Response	15	
<b>Total</b>	<b>40</b>	<b>100.0</b>

Table 15 (continued)

Secondary Educators	f	%
7. General public		
Don't Know	5	20.0
None	5	20.0
Little	8	32.0
Moderate	6	24.0
High	1	4.0
No Response	15	
Total	40	100.0

Note. f = frequency; % = percent; N = 40.

moderate support from top level administrators. Both of the educators indicated that they did not know the extent of support.

Twelve college/university educators provided data regarding the amount of support they received. The data are listed in Table 16. One third (33%) of the educators indicated they received little support for their graphic arts programs from department colleagues, one fourth (25%) indicated moderate support, and one third (33%) indicated high support. Half (50%) of the educators received moderate support from their department heads and one third (33%) received high support. With regards to the dean, over two fifths (44%) of the educators received moderate support and over half (55%) received little or no support. Over half (58%) of the educators received little or no support from top level administrators while a third (33%) received moderate to high support.

Table 16

Frequency and Percent of General Degree of  
Support for Iowa Graphic Arts Programs by  
College/University Educators

College/University Educators	f	%
<b>1. Dept. colleagues</b>		
Don't Know	0	0.0
None	1	8.3
Little	4	33.3
Moderate	3	25.0
High	4	33.3
No Response	28	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>2. Dept. head</b>		
Don't Know	0	0.0
None	0	0.0
Little	2	16.7
Moderate	6	50.0
High	4	33.3
No Response	28	
<b>Total</b>	<b>40</b>	<b>100.0</b>
<b>3. Dean</b>		
Don't Know	0	0.0
None	3	33.3
Little	2	22.2
Moderate	4	44.4
High	0	0.0
No Response	31	
<b>Total</b>	<b>40</b>	<b>100.0</b>

Table 16 (continued)

College/University Educators	f	%
4. Top level administrators		
Don't Know	1	8.3
None	2	16.7
Little	5	41.7
Moderate	3	25.0
High	1	8.3
No Response	28	
Total	40	100.0

Note. f = frequency; % = percent.

Curriculum changes in the past three years. In question eleven the educator was asked how his/her graphic arts curriculum changed in the past three years regarding content and courses. Nine people responded that no changes had occurred.

When asked to specify what course content was changed during this same time period, 24 educators responded. Almost half indicated they incorporated more computer applications such as desktop composition and typesetting. Others emphasized more prepress and press operations and de-emphasized letterpress printing. Several others incorporated more photography into their curriculum.

Ten educators added new courses. These included such titles as introductory graphic, graphic communications, desktop publishing, typesetting, and estimating and management courses.

Three educators stated that courses had been cancelled. One layout course was dropped and replaced with desktop publishing and a vocational printing course was cancelled. In another situation an entire vocational center was eliminated which further restricted course offerings in graphic arts. No reason was given for this closing.

Curriculum changes in the next three years. In question 12 the educator was asked to project how his/her graphic arts curriculum will change in the next three years regarding course content and courses. Nine educators indicated they foresaw no changes in their curriculum. One high school and one university educator said their graphic arts enrollment was not increasing and planned no curricula changes. One educator at a four year college indicated that budget restraints were limiting the amount of changes that could be made to his curriculum.

When asked what course content will change in the next three years, 21 educators responded. Almost half predicted an increase in the use of electronic composition. Others planned to go into more depth in curricula areas of lithography, photography, process camera work, laser imaging, and darkroom techniques.

Twelve educators indicated they will add new courses to their programs. These courses will include advanced printing, basic and advanced photography, lithography, electronic paste-up and composition, estimating, 2-color press work, graphic arts management, flexography, gravure, typesetting, and possibly color scanning.

At three high schools, some graphic arts courses will be cancelled due to the decline in enrollment and competition for students from other

academic programs. A one semester graphic arts course designed for business students will be phased out.

Comments from educators. Selected comments from educators are presented in Appendix O. The comments are grouped under two categories including comments regarding graphic arts programs and other comments.



CHAPTER V  
REPORTING THE RESULTS: SUMMARY, CONCLUSIONS,  
AND RECOMMENDATIONS

The basis for any study is to investigate a problem, collect and analyze data, and report the findings. A summary of the results, conclusions, and recommendations of this study are reported on the following pages.

General Summary

The first purpose of this study was to determine if differences exist between the perceptions of manufacturers and educators regarding current (1988) and future (1993) employment needs for skilled, management, and sales personnel identified by selected employee functions; and among manufacturer groups and educator groups regarding current and future needs. The second purpose was to gather demographic information relevant to the manufacturers and educators.

Determining employment needs can be useful to guidance counselors and placement specialists regarding career opportunities for students and for graphic arts educators for updating their curriculum. The information may also be helpful in identifying curricular content for instructional programs in public and private schools, trade association courses, and industry training programs.

Questions regarding demographic information pertaining to manufacturers and educators were developed from a review of the literature and in consultation with other educators. These questions

were used to further identify employment practices and gather information regarding graphic arts educator activities and programs.

#### Summary of Research Procedures

Various methods were utilized in conducting this study. Graphic arts manufacturers and graphic arts educators in the state of Iowa served as the database. Support for the study was provided by personnel at the Congdon Printing Company, Graphic Arts Technical Foundation, International Association of Printing House Craftsmen, International Graphic Arts Education Association, Iowa Department of Education, and the Printing Industries of the Midlands.

A proportional stratified random sample of graphic arts manufacturers was generated from information provided in the Directory of Iowa Manufacturers: 1987-1988 (IDOED, 1987a) under the listing of Standard Industrial Classification Number 271-279 (Appendix D). A membership list from PIM was also used in determining the total graphic arts manufacturers in Iowa. From a population of 715 manufacturers, 250 (35%) were sampled.

The listing of high school graphic arts educators was limited to information provided on a computer printout by personnel in the Iowa Department of Education (IDOE, 1988a) and a review of the Iowa Educational Directory: 1987-88 School Year (IDOE, 1987a). In addition, the Directory of Secondary, Technical, and Trade and Industrial Education Personnel in Iowa for 1987-88 was utilized (IDOE, 1987b).

A listing of postsecondary personnel was limited to names and programs in the (a) Industrial Teacher Education Directory (Dennis,

1987), (b) Membership Directory: 1987-88 (IGAEA, 1987), (c) Technical Schools, Colleges and Universities Offering Courses in Graphic Communications (GATF, 1988), (d) another computer printout provided by the IDOE (1988b), (e) the college catalog microform collection listing Iowa technical and post-high school institutions (Career, 1987), and (f) communication with other educators.

The study did not include personnel in art, commercial art, or business departments. Since the number of graphic arts educators was limited, a sample of the population was not used. Instead, all 46 educators were used in the study. Jurors and educators who participated in pilot-testing the instruments were not part of this number.

To secure the information, two instruments were developed. Part I of both instruments consisted of a listing of employee areas commonly found in graphic arts plants. Participants were asked to express their opinions regarding the current and future demand for skilled production workers, management, and sales personnel. Part II of both instruments consisted of 26 issue statements regarding employment factors and other factors relevant to the Iowa graphic arts industry.

Part III of the manufacturers' opinionnaire consisted of the same listing of employee areas found in part I. In part III the manufacturers were asked to indicate the actual demand at their plant site for workers currently needed and the probable demand in five years.

Part IV of the manufacturers' opinionnaire consisted of questions regarding company characteristics and employment practices. Part III of the educators' opinionnaire was used to gather demographic data.

Characteristics of educators and information regarding their professional activities and programs were identified.

The instruments were validated for content by juror members in the summer of 1988, and pilot-testing occurred the following September. Suggestions for revisions were made and the final instruments were printed.

In October, 1988, opinionnaires were sent to 250 manufacturers and 46 educators. Included in the packet of materials were appropriate incentives used to maximize the return rate. By December 31, 1988, manufacturers returned 181 usable opinionnaires and educators returned 40. These numbers represented a 72% and 87% return, respectively. These data were processed at the University of Northern Iowa computer services department.

The appropriate t-test for independent means or for matched pairs was used to test each of the hypotheses. When differences were found between perceived means at the .05 level of significance, the item tested was identified as having statistical significance.

#### Summary of Findings

Significant differences were found in 10 employee areas concerning the current demand for employees in selected areas in the Iowa graphic arts industry as perceived by graphic arts manufacturers and graphic arts educators. Both groups were in agreement concerning a high demand for personnel in these areas: production management, sales representative, phototypesetting, electronic image assembly, process color stripping, and lithography sheet all color printing over 17 x 22

size. A low demand was indicated for hot metal, strike-on composition, letterpress platemaking and letterpress operations even though significant differences were not indicated for these areas.

Significant differences were found in 12 employee areas concerning the future demand for employees in selected areas in the Iowa graphic arts industry as perceived by manufacturers and educators. Manufacturers and educators are in agreement with the perception that there is a great demand for employees with skills related to color printing, electronic imagery and telecommunications, and all management and sales areas. They also agree that there is a decreased demand for personnel in hot metal, strike-on, and letterpress areas. Educators seem to constantly overestimate the demand for additional or fewer workers.

A comparison was made between current and future demand for employees as perceived among the manufacturers' group and among the educators' group. Thirty-two significant differences were found within the 40 employee areas.

Fifteen production areas, three management areas, and two sales areas were found to be significant among the manufacturers' group and among the educators' group. These areas included creative designer, hot metal composition, strike-on composition, electronic image assembly, satellite telecommunications, process color camera operations, color scanner operations, process color stripping, screen process platemaking operations, flexography platemaking operations, lithography printing of all color sheet stock (over 17 x 22), web all color printing, screen process printing, flexography printing, and automated gathering/

stitching/trimming operations. The management areas included plant administration, production management, and personnel management. The sales areas included estimator and sales representative.

In twelve additional production areas, significant differences were found among the responses provided by the manufacturers' group alone. These areas included illustrator, copy writer, photographer, phototypesetting operations, editing/proofing, paste-up, black and white camera operations, letterpress platemaking operations, gravure platemaking operations, letterpress printing processes, cutter operations, and folder operations.

Of the 27 production areas cited above, seven areas were identified as having a perceived decrease in demand for workers in five years. These areas were hot metal composition, strike-on composition, paste-up, phototypesetting, black and white camera operations, letterpress platemaking operations, and letterpress printing. The other 20 areas displayed a perceived increase.

Significant differences were found in six of the 26 issues concerning selected issues regarding employment and related factors. These six issues involved changes in skill/technical knowledge in the scanner separation area and color proofing area, equipment funding for Iowa's high schools and vocational high schools, the availability of free training sessions, and industry sponsored internships.

More than half the manufacturers and educators indicated that skill/technical knowledge increased over the last five years for workers in design and layout, typesetting and copy preparation, camera color separation, scanner separation, pressroom operations, and management and

sales operations. While two-thirds of the educators reported skill/technical knowledge increased for color proofing workers, over half of the manufacturers indicated that little change occurred.

When comparing the effects of automation on the need for skilled production workers, the participants were divided on the issue. Forty percent of the manufacturers and 45% of the educators, however, perceived that fewer workers would be needed.

Over two-thirds of the manufacturers and educators agreed that there was a shortage of skilled production workers. No agreement within groups or between groups was evident concerning the supply of management and sales personnel.

There was a strong indication by both groups (59% and 83%) that the employment needs of the graphic arts industry will be met by educators and their graphic arts programs at three institutional levels. In ranked order, these are: (1) post-secondary vocational schools, (2) colleges/universities, and (3) vocational high schools. General high school graphic arts programs were not perceived to be meeting tomorrow's needs of the industry according to 80% of the manufacturers and 73% of the educators.

Over half of the manufacturers and almost all of the educators agreed that personnel in the graphic arts industry should set aside funds to upgrade equipment in graphic arts programs in Iowa's educational institutions. However, the level of agreement varied according to the type of instructional program offered. In ranked order, funds should be directed towards programs at the (1) post-

secondary vocational/technical schools, (2) vocational high schools, (3) colleges/universities, and (4) general high schools.

The vast majority (82%) of the manufacturers and all of the educators agreed that personnel in the graphic arts industry should offer free training sessions to graphic arts educators and internships to students and educators interested in upgrading their skills/knowledge.

The manufacturers reported the actual number of employees they currently need and the demand for employees in five years at their plant sites. The actual demand for workers did not always agree with the perceived demand reported by the manufacturers and educators.

The highest current demand for over 100 employees was indicated by manufacturers to be in 11 areas which included eight production areas, two management areas, and one sales area. The greatest need in each of these job classifications is for paste-up workers, sales representatives, and plant administration personnel. According to the manufacturer respondents, there is a current need for 2,322 skilled production workers, 313 management personnel, and 290 sales personnel. These numbers constitute only a portion of total demand in Iowa.

The highest projected demands for over 100 employees in five years were found in 16 production areas, two management areas, and two sales areas. The greatest future need in each of these job classifications is for sales representatives, paste-up production workers, and production management personnel. The manufacturers sampled, estimated a need for 3,648 production personnel, 468 management personnel, and 459 sales



personnel. These numbers constitute only a portion of the total demand in Iowa as indicated by the manufacturers who returned usable opinionnaires.

According to manufacturers, the most desired educational level of new employees is for workers to have a vocational/technical institute background. The second most desired level was a general high school level of education. At least two years of community college experience was reported to be desired for sales personnel. Manufacturers reported that they desire their managers to have a four year college/university background. Advancement within the company is the preferred source of skilled production workers according to (45%) of the manufacturers.

When seeking to hire new skilled production workers, the most important qualifications manufacturers look for are ranked as: (1) attitude/work habits and (2) technical knowledge/skills. For management and sales personnel the most important qualifications sought are ranked as follows: (1) the ability to communicate and (2) ambition and initiative.

The most important problems identified by manufacturers in the retention of personnel are poor knowledge/skill ability and the inability to get along with each other. These two problems are rated the most important in the retention of all three classifications of employees including skilled workers, management, and sales personnel.

Two-thirds of Iowa graphic arts companies are small in size with 20 or fewer employees. Half the manufacturers employ 10 or fewer people.

Although some manufacturers use more than one printing process, over three-fourths (79%) use lithography as a major printing process and

over one-third (38%) use letterpress. Over half (53%) of the respondents reported that the use of lithography and electrostatic processes had increased during the past five years while almost half (48%) said the use of letterpress had decreased during the same time period. Manufacturers reported that the percent of production time devoted to the use of the other printing processes had not changed.

Characteristics of educators, their activities, and programs were investigated. Although half (50%) of the educators are between the ages of 35-44, a fourth (23%) are 50 years of age or older; 15% are at least 55 years old and approaching retirement. Forty-percent of the respondents had completed master's or doctoral degrees. Over half (54%) of the educators taught at a general high school while a quarter (24%) taught at a four year college/university. While the educators taught graphic arts for an average of nine years, their total teaching experience averaged 13 years. Twenty-one educators (53%) had some full or part-time work experience in the graphic arts industry with the mean being 10 years and the median four years. Graphic arts educators used several methods to keep up to date. These were ranked: (1) attending seminars, workshops, inservice training, (2) reading trade journals, magazines, and (3) contacts with vendors and technical representatives.

In regard to curriculum, it was found that not enough emphasis is being placed on job opportunities for sales personnel and management personnel when educators discuss employee groups with students. Half of the educators update their curriculum every one to two years. The other half update their curriculum every three to five or more years.

Enrollment in graphic arts has changed over the past three years. While an increase in enrollment was indicated by a quarter (26%) of the respondents, a third (33%) indicated a decrease in graphic arts student enrollment. Two-fifths (41%) indicated that no change occurred.

The educators receive various degrees of support for their programs from different individuals. Generally, high school teachers receive little or no support from: teachers of other disciplines (56%), board of education members (56%), guidance counselors (52%), superintendent (52%), and the general public (52%). Public relation materials regarding graphic arts education and the industry need to be developed and directed towards these individuals, especially towards guidance counselors who may be influential in the decision making process of students enrolling in certain school programs. Over half (58%) of college/university educators indicated they generally received little or no support from top level administrators and over half (55%) received little or no support at the dean's level.

Educators stated that their curricula have changed in content over the past three years. Nine educators responded that no changes occurred. Approximately one-dozen educators incorporated more computer applications into their curriculums such as desktop publishing and typesetting. Ten educators added new courses such as an introduction to graphic arts, graphic communications, desktop publishing, typesetting, estimating, and management. Three educators gave various reasons why graphic arts courses were dropped.

Nine educators foresaw no changes taking place during the next three years in course content. Twenty-one educators predicted an increase in

the use of electronic composition. Others indicated going into greater depth in five curricula areas.

Twelve educators planned to add 11 new courses. However, some graphic arts courses will be deleted due to declining enrollment and competition for students from other academic programs.

### Conclusions

Subject to the stated assumptions and limitations of this study and to the extent that the data gathered were accurate, the following conclusions are presented. These conclusions are based upon an analyses of the obtained data.

1. There were significant differences between the manufacturers' and educators' opinions concerning the current demand for skilled graphic arts production workers and management personnel in nine of 35 production areas and one of three management areas. The educators perceived a greater current demand than the manufacturers for employees in these graphic arts production and management areas.

2. There were significant differences between the manufacturers' and educators' opinions concerning the future demand for graphic arts production workers and management personnel in 11 of 35 production areas and one management area. The educators perceived a greater future demand than the manufacturers for employees in these graphic arts production and management areas.

3. A comparison of opinions among manufacturers regarding current demand and demand in five years for graphic arts employees indicated differences. They perceived a significant increase in future demand for

skilled workers in 20 production areas, management personnel in three areas, and sales personnel in both areas as compared to the current demand. Manufacturers indicated a decreased future demand for skilled graphic arts workers in seven production areas as compared to the current demand.

A comparison of opinions among educators regarding current demand and demand in five years indicated differences. They perceived a significant increase in future demand for skilled workers in 13 production areas, all three management areas, and both sales areas, as compared to the current demand. In addition, they indicated a decrease in the future demand for skilled workers in two production areas.

4. There was a difference of opinion between the manufacturer and educator groups regarding issues of employment and other factors. For six of the issues significant differences between the two groups were found. The educators agreed that there was a greater increase in skill and technical knowledge needed for graphic arts workers in the past five years. They also agreed that funds should be provided by companies for equipment and that free training and internships should be provided for both students and educators.

5. Additional skill and technical knowledge required of graphic arts employees had increased during the past five years in five production areas and in management and sales.

6. There is a shortage of skilled production workers in Iowa and an increasing need for sales and management personnel.

7. There does not seem to be a consensus regarding the affects of automation on the need for production workers.

8. Graphic arts programs at the postsecondary vocational/ technical institutes, colleges/universities, and vocational high schools appear to be meeting the needs of personnel in the graphic arts industry. However, it seems that general high school graphic arts programs may not be meeting the needs of the industry.

9. There is consensus between manufacturers and educators that personnel in the graphic arts industry should set aside funds to upgrade graphic arts equipment in Iowa graphic arts programs. However, levels of agreement varied according to the level of program indicated.

10. There is consensus between manufacturers and educators that personnel in the graphic arts industry should offer free training sessions to educators and internships to graphic arts students/educators to upgrade their skills/knowledge.

11. Within the three employee job classifications, there currently appears to be a great need for paste-up workers, sales representatives, and plant administration personnel in that order.

12. Within the three employee job classifications, the greatest future need appears to be for sales representatives, paste-up production workers, and production management personnel in that order.

13. The current demand is for 2,322 skilled production workers, 313 management personnel, and 290 sales personnel. The projected demand in five years for skilled production workers is estimated at 3,648. For management and sales personnel, the demand is estimated to be 468 and 459, respectively. These numbers only represent the probable demand stated by the manufacturers who returned usable opinionnaires.

14. Advancement through the company is the preferred source for skilled workers; colleges/universities are the preferred source for management personnel; and there is no consensus for the preferred sources for sales personnel.

15. Two highest qualifications manufacturers seek when hiring skilled production workers, in ranked order, are (1) attitude/work habits and (2) technical knowledge/skills, and for management and sales personnel, the qualifications are (1) the ability to communicate and (2) ambition and initiative.

16. Major reasons why manufacturers do not retain skilled workers, management, and sales personnel are because of poor knowledge or skill ability and the inability to get along with others, in that order.

17. The majority of Iowa's graphic arts companies are small in size. Fifty percent of the manufacturers employed 10 or fewer workers and 67% employed 20 or fewer workers.

18. The majority of Iowa graphic arts manufacturers utilize the lithography and letterpress printing processes. Lithography is increasing in use and letterpress is decreasing.

19. One fourth (23%) of graphic arts educators are at least 50 years old and will have to be replaced due to retirement in the next 10 to 15 years.

20. An inadequate amount of emphasis is being placed on job opportunities regarding sales and management personnel, when educators discuss employee groups with students.

21. Half the educators may need to update their curriculums earlier than every three to five years due to the rapidly changing technology

occurring in the industry. This is especially important for educators at the post-secondary level.

22. High school graphic arts teachers receive little or no support for their programs from various individuals including counselors who may be influential in guiding students onto certain career paths.

23. Educators may have inflated expectations regarding employment needs and may have to interact with industry personnel so as to formulate programs to better meet those needs.

24. There is an increasing demand for production workers with skills in color printing, electronic imagery and telecommunications, and for all areas of management and sales personnel.

25. The need for hot metal operations is decreasing.

#### General Recommendations

The following five recommendations are based upon the findings of the study and the conclusions drawn from this investigation. Those recommendations, hopefully, will be valuable guidance to graphic arts personnel.

1. A greater effort in recruitment practices needs to be made to address the shortage of skilled production workers. Personnel from industry, trade associations, and education need to work cooperatively to address this concern.

2. With assistance from manufacturers and trade association personnel, a public relations program involving a variety of media should be developed and focused especially at high school guidance counselors. The objective would be to introduce the graphic arts



industry as a high technology industry (not as a craft) and promote graphic arts career opportunities. A similar program should also be developed for local cable television to educate community members about the industry and to seek their support to maintain and expand graphic arts programs and increase student enrollment in those programs.

3. A committee representing graphic arts manufacturers, trade associations, and educators should be formed to secure funds for upgrading graphic arts equipment in Iowa educational institutions.

4. Graphic arts educators should place greater emphasis on job opportunities of sales and management personnel when discussing employee groups with students.

5. Graphic arts educators should update their curriculums every one to two years due to the rapidly changing technology that impacts on employment in the industry.

#### Recommendations For Further Research

Additional recommendations are warranted and can result in the gathering of information to further define the needs of the graphic arts industry for personnel. Eight such recommendations are made.

1. A study should be conducted to ascertain why general high school graphic arts programs are not perceived to be meeting tomorrow's needs of the Iowa graphic arts industry and what can be done to reverse this perception.

2. A study should be made of personnel in Iowa's graphic arts industries to determine the willingness of manufacturers to participate in providing free training sessions for educators and internship

experiences for graphic arts students and educators to help them upgrade technical skills/knowledge. The most desirable positions in the graphic arts industry in which to place the educators and students can also be determined through such a study.

3. A study should be conducted to identify competencies needed by college-level graphic arts students for placement in supervisory and management and sales positions in the Iowa graphic arts industry.

4. A study should be conducted to identify competencies needed by skilled workers in various production areas.

5. A study similar to this research should be made but focused on individual segments (SIC number) of the Iowa graphic arts industry.

6. A similar study should be conducted in neighboring states to determine the graphic arts industry employment and to further validate the results of this research.

7. The study should be repeated in 1993 to see what differences, if any, are indicated by the findings of this research effort.

8. A study should be undertaken to find the ways and means by which the educators and personnel in the graphic arts industry can be of maximum assistance to each other.

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APPENDICES

## APPENDIX A

## LETTERS OF SUPPORT FOR THE STUDY

1. MR. JAMES R. FREY
2. MR. JOHN D. MERTZ
3. DR. JESUS R. RODRIGUEZ
4. MS. KRISTI LITTLE
5. MS. JUNE HARRIS
6. DR. JACK SIMICH
7. MR. JAMES R. FREY (TO MFGS.)
8. DR. VIRGIL R. PUF AHL



**Printing Industries of the Midlands, Inc.**

P.O. Box 1924  
Des Moines, Iowa 50306  
(515) 282-4880 or 1 800 835-7427 ext. 359

February 22, 1988

John Gindele  
Apt. 235, 1939 College St.  
Cedar Falls, IA 50613

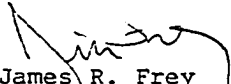
Dear John:

This letter will confirm our recent conversation in regards to your study on the future employment needs of printing and graphic arts companies in our area. The Printing Industries of the Midlands, Inc. supports a study like this. I know the results will be of importance to both the printing and graphic arts employers and also to the secondary and post-secondary schools offering graphics programs.

Please let me know how I can help in this project.

Thank you.

Sincerely,



James R. Frey  
Executive Vice President

JRF/nb

"Serving the Printing Industry of Iowa, Nebraska and South Dakota"





Plain Talk Publishing Company

511 Sixth Avenue East • Des Moines, Iowa 50309

February 23, 1988

515-282-0485

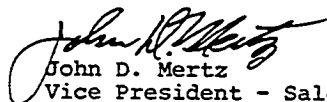
Mr. John Gindele, Ed.S.  
Department of Industrial Technology  
University of Northern Iowa  
Cedar Falls, Iowa 50614

Dear Mr. Gindele,

I wish you well as you develop your dissertation, "The Employment Needs of the Graphic Arts Industry of Iowa". Our Industry in Iowa has a need for competent skilled craftsmen and management people. In addition, we have an even greater need for sales people who are versed in professional selling and marketing techniques and have at least general knowledge of current technology.

Our company, along with others in the midwest would certainly be interested in the results of your efforts. We have always cooperated with our local Vo-tech high school and DMACC with the idea of helping to increase the labor pool. Speaking as a representative of the International Association of Printing House Craftsmen, that organization would certainly be interested in the results of your efforts. We would be interested in helping disseminate your results thru programs attended by local Craftsmen and thru our monthly publications.

Sincerely,

  
John D. Mertz  
Vice President - Sales



Department of Printing • Pittsburg, Kansas 66762 • 316/231-7000, Ext. 4419

March 1, 1988

John Gindele  
University of Northern Iowa  
Department of Industrial Technology  
Cedar Falls, IA 50614

Dear John,

Congratulations and good luck in your study, it was good to hear from you. I appreciate your situation and would certainly want to assist in any way that I can.

It looks like you are well on your way in completing your work. You certainly have my permission to adopt and incorporate aspects of my design in the study that I did in Texas.

Best wishes and let me know if I can help you further, and please share with me your findings.

Say hello to Joe for me.

Sincerely,

A handwritten signature in cursive script that reads 'Jesus'.

Jesus J. Rodriguez, Ph.D., CGCM  
Associate Professor  
Printing Management



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF GENERAL SERVICES  
JACK B. WALTERS, DIRECTOR

March 14, 1988

Mr. John Gindele, Ed.S.  
Doctoral Candidate  
1939 College Street - Apt. 235  
Cedar Falls, Iowa 50613

Dear Mr. Gindele,

Your letter to Mr. Thoms of the Iowa Department of Economic Development has been forwarded to the Department of General Services Printing Division. Our division has the responsibility for coordinating the graphic arts needs of state agencies.

As Superintendent of Printing/Mail for the State of Iowa, I am particularly interested in your research topic since I work with graphics each day. The graphics art industry is changing rapidly. It has been difficult to find skilled workers and management personnel for our inplant operations. We must provide many hours of training because people do not have the background experience needed. I have heard this from others in my profession as well.

I would support your study, and believe it would be a valuable tool to enhance the graphics industry.

Sincerely,

A handwritten signature in cursive script that reads "Kristi Little".

Kristi Little  
Superintendent of Printing

PRINTING DIVISION / GRIMES STATE OFFICE BUILDING / DES MOINES, IOWA 50319 / 515-281-5231



TERRY E. BRANSTAD, GOVERNOR

DEPARTMENT OF EDUCATION  
WILLIAM L. LEPLEY, ED.D., DIRECTOR

March 24, 1988

Mr. John Gindele, ED. S.  
University of Northern Iowa  
Industrial Technology Center  
Cedar Falls, IA 50614

Dear Mr. Gindele:

The study you proposed in your letter of February 18, 1988 would be of interest to the Career Information System. We are always searching for current information about the employment needs in Iowa; the most useful information for the CISI system that is ongoing in collection. Our system is updated annually. However, any new information collected is of value particularly in an industry that is changing as rapidly as the graphic arts industry.

If CISI can be of help to you in this project please contact our office at (515) 281-4736. As information consultant, I would be willing to contribute as possible within the limits of my duties.

CISI would be most interested in receiving the results of this study. Our system is part of a larger group of fifteen states which support career information system that often share information. Therefore, your study would have a potential of being valuable to other states as well.

We will be looking forward to participating in your project and benefiting from the resulting information.

Sincerely,

June Harris, Consultant  
Career Information System of Iowa  
DEPARTMENT OF EDUCATION

JH:lm

GRIMES STATE OFFICE BUILDING / DES MOINES, IOWA 50319-0146

GRAPHIC ARTS  
TECHNICAL FOUNDATION



GRAPHIC ARTS TECHNICAL FOUNDATION • 4615 FORBES AVENUE • PITTSBURGH, PENNSYLVANIA 15213-3796 • (412) 621-6941 • TELEX: 9103509221 • CABLE: GATRWorld

April 5, 1986

Mr. John Gindele  
1939 Coliége Street, Apt. 235  
Cedar Falls, IA 50613

Dear John,

Your doctorate dissertation dealing with employment needs in the graphic arts industry in Iowa will be of major importance for your State, and perhaps it will stimulate interest on the part of other States to pursue such a study. As you know, it is extremely important for industry to respond to your opinionnaire, and I am confident that the graphic arts industry and Iowa will support this major undertaking. The industry and Iowa will have everything to gain from the short time they will invest in completing the opinionnaire.

John, I fully support your study; not only will it benefit the graphic arts industry and Iowa, but will have a tremendous implication to graphic arts education in your State. I would appreciate receiving a copy of your results. Perhaps the Iowa study will set the pace for other States to follow suit.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jack', written in a cursive style.

Jack Simich  
Education Director

JS/db

**Printing Industries of the Midlands, Inc.**

11009 Aurora Avenue  
Des Moines, Iowa 50322  
(515) 270-1009 or 1 800 234-7427

August 1988

Dear Members of the Graphic Arts Industry:

Ref: Research Study Survey

The Printing Industries of the Midlands, Inc. (PIM) is cooperating with John F. Gindele, Project Director, of the University of Northern Iowa in a research study. John is conducting the survey as part of his doctoral research at UNI. The research study is titled the Employment Needs of the Graphic Arts Industry in Iowa.

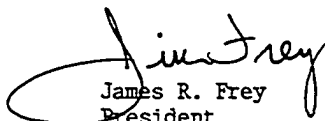
Approximately 35% of printing and graphic arts companies will be included in the sampling process. If you receive one of the survey instruments I would like to ask that you complete it. All high school and community college graphic arts educators will also be surveyed.

A statewide study of this type has never been undertaken before.

All concerned groups have an interest in identifying the future employment needs of the graphic arts industry. The results of this study will be beneficial to all printing companies, graphic arts schools and suppliers to the industry.

Thanks for your cooperation and participation in the survey.

Sincerely,



James R. Frey  
President

JRF/nb

"Serving the Printing Industry of Iowa, Nebraska and South Dakota"

4615 Forbes Avenue  
Pittsburgh, PA 15213

412-682-5170



**International Graphic Arts  
Education Association, Inc.**

August 1988

Dear Iowa Graphic Arts Educator:

Ref: Research Study Opinionnaire

The International Graphic Arts Education Association and Graphic Arts Technical Foundation is cooperating with John F. Gindele, Project Director, of the University of Northern Iowa in a research study. John is conducting the study entitled: Employment Needs of the Graphic Arts Industry in Iowa, as part of his doctoral research through the Department of Industrial Technology.

All 70 Iowa high school (grades 9-12), vocational/technical, community college, and 4-year college/university graphic arts educators will be included in the sampling process. Approximately 35 percent of Iowa's printing and graphic arts companies will also be included. When you receive the opinionnaire, I would like to ask that you complete the opinionnaire and return it as soon as possible.

A statewide study of this type has never been undertaken before in Iowa.

All concerned groups have an interest in identifying the future employment needs of the graphic arts industry. The results of this study will be beneficial to all graphic arts educators as well as printing company personnel and suppliers to the industry.

Thank you for your cooperation and participation in the study.

Sincerely,

Virgil Pufahl  
President

**President**

**VIRGIL PUFALH**  
Department of Communication  
University of Wisconsin  
Platteville, WI 53818  
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## APPENDIX B

## MATERIALS SENT TO MANUFACTURERS

1. PRENOTIFICATION POSTCARD
2. OPINIONNAIRE
3. COVER LETTER
4. ENDORSEMENT LETTERS
5. GIFT INCENTIVE
6. THANK YOU/FOLLOW-UP POSTCARD
7. SECOND FOLLOW-UP LETTER
8. THIRD FOLLOW-UP LETTER



## PRE-NOTIFICATION POSTCARD

October 25, 1988

Dear (Personalized):

I am asking your help in a statewide research project.

Important issues have been raised by manufacturers and educators concerning the demand for qualified personnel in Iowa's graphic arts industry.

In a few days you will receive an "employment needs" opinionnaire which should take but a few minutes to complete.

I would appreciate your cooperation in completing and returning this short form.

Sincerely,

John Gindele, Doctoral Candidate  
University of Northern Iowa  
Department of Industrial Technology

Code: \_\_\_\_\_  
(For follow-up purposes ONLY)

## Employment Needs of Iowa's Graphic Arts Industry\*

### Manufacturers' Opinionnaire

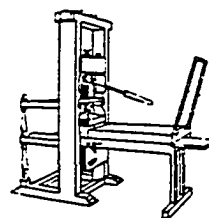
Your opinion is needed regarding employment trends and issues concerning the demand for graphic arts personnel in Iowa. The information will be used to help graphic arts manufacturers and educators identify and meet current and future employment needs of the industry.

The opinionnaire should take approximately 20 minutes to complete.

Your responses will be kept strictly confidential. Please answer all of the questions.

**Your assistance in completing this opinionnaire will be very valuable for my research!**

John F. Gindele, Research Director  
Candidate, Doctor of Industrial Technology  
Department of Industrial Technology  
University of Northern Iowa  
Cedar Falls, Iowa 50614-0178



\*Endorsed by The Printing Industries of the Midlands, Inc. (PIM), Graphic Arts Technical Foundation (GATF), Craftsmens Clubs of Des Moines, Iowa City, Omaha, & Waterloo, International Graphic Arts Education Association (IGAEA), and the Career Information Systems of Iowa (Dept. of Education).

Definitions

To assist in the completion of this opinionnaire, the following definitions are provided for use in this study.

**Demand.** The need of industry for workers as a result of expansion or replacement.

**Skilled workers.** Company employees (from trainees through experienced craftspeople) who have the special skills necessary to handle materials and operate specialized equipment.

**Management Personnel.** Company employees with executive ability whose responsibilities are to control and direct people and the operations within a department.

**Sales Personnel.** Company employees responsible for selling all phases of printing, and generally serve as technical or customer relations representatives between the customer (buyer) and the company (seller).

**Graphic Arts.** The area of technology in which printed products are produced. Graphic Arts is sometimes referred to as GRAPHIC COMMUNICATIONS, COMMUNICATIONS TECHNOLOGY, PRINTING, VISUAL COMMUNICATIONS.

### I. Perceived Demand for Personnel Iowa-Wide

In Column I below is a list of General Employee Functions regarding skilled, management, and sales personnel usually found in graphic arts plants.

- Directions:
1. Circle the number in Column II that expresses YOUR opinion as to the current demand for these workers in the industry. Please do not limit your responses to your operation, but consider Iowa's Graphic Arts Industry as a Whole.
  2. Circle the number in Column III that expresses YOUR opinion as to the demand for these workers in five years (1993).

Example:

(I) Employee Functions	(II) Current Demand				(III) Demand in 5 Years			
	None	Low	Moderate	High	None	Low	Moderate	High
Color scanner operations	1	2	③	4	1	2	3	④

In this example, the respondent believes there is currently a "moderate demand" (3) for color scanner operators in Iowa, and will be a "high demand" (4), in five years.

Please respond to each item. Thank You!

(I) Employee Functions	(II) Statewide Current Demand				(III) Statewide Demand in 5 Years			
	None	Low	Moderate	High	None	Low	Moderate	High
<b>SKILLED PRODUCTION WORKERS</b>								
<b>1. Design and Layout</b>								
① Creative designer .....	1	2	3	4	1	2	3	4
② Illustrator .....	1	2	3	4	1	2	3	4
③ Layout-copy mark-up .....	1	2	3	4	1	2	3	4
④ Copy writer .....	1	2	3	4	1	2	3	4
⑤ Photographer .....	1	2	3	4	1	2	3	4
<b>2. Typesetting and Copy Preparation</b>								
① Hot metal .....	1	2	3	4	1	2	3	4
② Strike-on .....	1	2	3	4	1	2	3	4
③ Phototypesetting .....	1	2	3	4	1	2	3	4
④ Electronic image assembly .....	1	2	3	4	1	2	3	4
⑤ Satellite Telecommunications .....	1	2	3	4	1	2	3	4
⑥ Editing/proofreading .....	1	2	3	4	1	2	3	4
⑦ Paste-up .....	1	2	3	4	1	2	3	4

Employee Functions	Statewide Current Demand				Statewide Demand in 5 Years			
	None	Low	Moderate	High	None	Low	Moderate	High
<b>3. Pre-Press Operations</b>								
1 Black & white camera .....	1	2	3	4	1	2	3	4
2 Process color camera .....	1	2	3	4	1	2	3	4
3 Color scanner .....	1	2	3	4	1	2	3	4
4 Black & white stripping .....	1	2	3	4	1	2	3	4
5 Process color stripping .....	1	2	3	4	1	2	3	4
Platemaking Operations								
6 Lithography .....	1	2	3	4	1	2	3	4
7 Letterpress .....	1	2	3	4	1	2	3	4
8 Screen process .....	1	2	3	4	1	2	3	4
9 Flexography .....	1	2	3	4	1	2	3	4
10 Gravure .....	1	2	3	4	1	2	3	4
<b>4. Pressroom Operations</b>								
Lithography								
1 Sheet (under 17 x 22) .....	1	2	3	4	1	2	3	4
2 Sheet b & w (over 17 x 22) .....	1	2	3	4	1	2	3	4
3 Sheet all color (over 17 x 22) .....	1	2	3	4	1	2	3	4
4 Web, black & white .....	1	2	3	4	1	2	3	4
5 Web, all color .....	1	2	3	4	1	2	3	4
Other Processes								
6 Letterpress .....	1	2	3	4	1	2	3	4
7 Screen process .....	1	2	3	4	1	2	3	4
8 Flexography .....	1	2	3	4	1	2	3	4
9 Gravure .....	1	2	3	4	1	2	3	4
<b>5. Binding/Finishing Operations</b>								
1 Hand/small machines .....	1	2	3	4	1	2	3	4
2 Cutter .....	1	2	3	4	1	2	3	4
3 Folder .....	1	2	3	4	1	2	3	4
4 Automated gather/stitch/trim .....	1	2	3	4	1	2	3	4

**MANAGEMENT PERSONNEL**

6. Plant Administration (e.g., office and finance operations, safety and environmental control, etc.) .....	1	2	3	4	1	2	3	4
7. Production Management (e.g., job planning, scheduling, production, material, quality control, etc.) .....	1	2	3	4	1	2	3	4
8. Personnel Management (e.g., training, labor relations, recruiting, etc.) .....	1	2	3	4	1	2	3	4

**SALES PERSONNEL**

9. Estimator .....	1	2	3	4	1	2	3	4
10. Sales (e.g., customer relations and service, technical rep., etc.) .....	1	2	3	4	1	2	3	4

## II. Iowa Graphic Arts Issues

11. Circle a number [1-3] for each area indicating if there has been a **Decrease**, **Little Change**, or **Increase** in skill or technical knowledge required for the job today as compared to the last five years (Fall 1983).

		Changes in Skill/Technical Knowledge Required in the Last 5 Years		
Employment Areas		Decrease	Little Change	Increase
<b>Skilled Production Workers</b>				
<input type="checkbox"/> 1	Design and Layout .....	1	2	3
<input type="checkbox"/> 2	Typesetting & Copy Preparation .....	1	2	3
<b>Pre-Press Operations</b>				
<input type="checkbox"/> 3	Camera, b & w .....	1	2	3
<input type="checkbox"/> 4	Camera, color separation .....	1	2	3
<input type="checkbox"/> 5	Scanner separation .....	1	2	3
<input type="checkbox"/> 6	Proofing, b & w .....	1	2	3
<input type="checkbox"/> 7	Proofing, color .....	1	2	3
<input type="checkbox"/> 8	Stripping/platemaking .....	1	2	3
<input type="checkbox"/> 9	Pressroom .....	1	2	3
<input type="checkbox"/> 10	Binding/Finishing .....	1	2	3
<input type="checkbox"/> 11	Management Personnel .....	1	2	3
<input type="checkbox"/> 12	Sales Personnel .....	1	2	3

12. How will automation affect the need for skilled production workers? (Circle a number):  
 (1) Less Wkrs. Needed                      (2) No Change                      (3) More Wkrs. Needed

Circle the level of agreement [1-4] describing the extent you agree or disagree with each of the following statements:

13. Of the following employee groups in Iowa's graphic arts industry, there is an adequate supply of:

	Strongly Disagree	Disagree	Agree	Strongly Agree
<input type="checkbox"/> 1 Skilled production workers .....	1	2	3	4
<input type="checkbox"/> 2 Management personnel .....	1	2	3	4
<input type="checkbox"/> 3 Sales personnel .....	1	2	3	4

14. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts educ. programs in Iowa's:

<input type="checkbox"/> 1 High schools .....	1	2	3	4
<input type="checkbox"/> 2 Vocational high schools .....	1	2	3	4
<input type="checkbox"/> 3 Post-secondary voc/tech schools .....	1	2	3	4
<input type="checkbox"/> 4 Colleges and universities .....	1	2	3	4

The graphic arts industry should...

15. Set aside funds to be used to upgrade graphic arts equipment in Iowa's:

<input type="checkbox"/> 1 High schools .....	1	2	3	4
<input type="checkbox"/> 2 Vocational high schools .....	1	2	3	4
<input type="checkbox"/> 3 Post-secondary voc/tech schools .....	1	2	3	4
<input type="checkbox"/> 4 Colleges and universities .....	1	2	3	4

16. Offer free training sessions to graphic arts educators to help upgrade their tech. skills/knowledge .....

1	2	3	4
---	---	---	---

17. Offer Internships to graphic arts students/educators interested in upgrading their skills and knowledge .....

1	2	3	4
---	---	---	---

### III. Actual Demand for Personnel at Your Plant Site

In Column I below is a list of General Employee Functions found in many Production, Management, and Sales areas of graphic arts plants.

- Directions:
1. Please read the information in Column I.
  2. For each function in Column I, indicate in Column II the **additional** number of workers you currently anticipate at your plant site.
  3. Indicate in Column III the change in number of workers you anticipate in five years at your plant site. This change may be an increase or a decrease.

Example	(I)	(II) Number of Workers		(III)
	PRODUCTION AREAS			
	Employee Functions	Current Demand	Demand in 5 Years	
	Color Scanner Operations	<u>1</u>	<u>3</u>	

In this example, the respondent indicates that the current demand is for 1 color scanner operator, and that 3 scanner operators will be needed in five years.

Please RESPOND ONLY TO THOSE ITEMS THAT PERTAIN TO YOUR PLANT SITE!

(I) Employee Functions	(II) Current Demand	(III) Demand in 5-Years
<b>SKILLED PRODUCTION WORKERS</b>		
<b>18. Design and Layout</b>		
<b>1</b> Creative designer .....	_____	_____
<b>2</b> Illustrator .....	_____	_____
<b>3</b> Layout/copy mark-up .....	_____	_____
<b>4</b> Copy writer .....	_____	_____
<b>5</b> Photographer .....	_____	_____
<b>19. Typesetting and Copy Preparation</b>		
<b>1</b> Hot metal .....	_____	_____
<b>2</b> Strike-on .....	_____	_____
<b>3</b> Phototypesetting .....	_____	_____
<b>4</b> Electronic image assembly .....	_____	_____
<b>5</b> Satellite Telecommunications .....	_____	_____
<b>6</b> Editing/proofreading .....	_____	_____
<b>7</b> Paste-up .....	_____	_____
<b>20. Pre-Press Operations</b>		
<b>1</b> Black & white camera .....	_____	_____
<b>2</b> Process color camera .....	_____	_____
<b>3</b> Color scanner .....	_____	_____
<b>4</b> Black & white stripping .....	_____	_____
<b>5</b> Process color stripping .....	_____	_____
Platemaking Operations		
<b>6</b> Lithography .....	_____	_____
<b>7</b> Letterpress .....	_____	_____
<b>8</b> Screen process .....	_____	_____
<b>9</b> Flexographic .....	_____	_____
<b>10</b> Gravure .....	_____	_____
<b>21. Pressroom Operations</b>		
Lithography		
<b>1</b> Sheet (under 17 x 22) .....	_____	_____
<b>2</b> Sheet b & w (over 17 x 22) .....	_____	_____
<b>3</b> Sheet all color (over 17 x 22) .....	_____	_____
<b>4</b> Web, black & white .....	_____	_____
<b>5</b> Web, all color .....	_____	_____

NOTE: These numbers do NOT reflect numbers of workers presently employed. They reflect anticipated changes in number of workers needed.

Employee Functions	Number of Workers	
	Current Demand	Demand in 5-Years
<b>Pressroom Operations, cont.</b>		
6 Letterpress .....	_____	_____
7 Screen process .....	_____	_____
8 Flexography.....	_____	_____
9 Gravure .....	_____	_____
<b>22. Binding/Finishing Operations</b>		
1 Hand/small machines .....	_____	_____
2 Cutter.....	_____	_____
3 Folder.....	_____	_____
4 Automated gather/stitch/trim .....	_____	_____
<b>MANAGEMENT PERSONNEL</b>		
23. Plant Administration (e.g., office and finance operations, safety and environmental control, etc.).....	_____	_____
24. Production Management (e.g., job planning, scheduling, production, material, quality control, etc.).....	_____	_____
25. Personnel Management (e.g., training, labor relations, recruiting, etc.) .....	_____	_____
<b>SALES PERSONNEL</b>		
26. Estimator .....	_____	_____
27. Sales (e.g., customer relations and service, technical rep., etc.) .....	_____	_____

### IV. Company Characteristics and Employment Practices

28. For each job category circle a number [1-6] for the desired educational level of new employees.

Job Categories	Less Than H.S.	General H.S.	Vocational H.S.	Voc. Tech. Inst.	2-Yr. Comm. Coll.	4-Yr. Coll./Univ.
<b>Skilled Production Workers</b>						
1 Layout and Design .....	1	2	3	4	5	6
2 Typesetting & Copy Prep .....	1	2	3	4	5	6
<b>Pre-Press Operations</b>						
3 Camera, b & w .....	1	2	3	4	5	6
4 Camera, color separation.....	1	2	3	4	5	6
5 Scanner separation.....	1	2	3	4	5	6
6 Proofing, b & w .....	1	2	3	4	5	6
7 Proofing, color .....	1	2	3	4	5	6
8 Stripping/platemaking .....	1	2	3	4	5	6
9 Pressroom .....	1	2	3	4	5	6
10 Binding/Finishing .....	1	2	3	4	5	6
11 Management Personnel .....	1	2	3	4	5	6
12 Sales Personnel .....	1	2	3	4	5	6

29. What are the preferred sources of new employees? (Circle a number [1-6] for each category)

Job Categories	Advance Within Co.	Other Co's.	Voc. Schls	2-Yr Coll.	4-Yr Coll/Univ	Other Specify: ↓
1 Skilled prod. workers	1	2	3	4	5	6
2 Management personnel	1	2	3	4	5	6
3 Sales personnel	1	2	3	4	5	6

30. Of the nine hiring characteristics, rank the top 3 which you consider most important when seeking new employees. Repeat this process for each job category—skilled, management, sales. (Use #1 for most important, #2 for second, #3 for third.)

**JOB CATEGORIES**

Hiring Characteristics	Skilled Prod. Wkrs.	Management Personnel	Sales Personnel
For EACH job category select any 3 of these, leaving 6 lines blank in each column:	(Rank Top 3 only)	(Rank Top 3 only)	(Rank Top 3 only)
1 Tech. knowledge/skills .....	_____	_____	_____
2 Attitude/work habits .....	_____	_____	_____
3 Previous job experience .....	_____	_____	_____
4 Interest in graphic arts .....	_____	_____	_____
5 Personal appearance .....	_____	_____	_____
6 Ambition and initiative .....	_____	_____	_____
7 Ability to communicate .....	_____	_____	_____
8 Ability to get along .....	_____	_____	_____
9 Willingness to improve job skills/ work knowledge .....	_____	_____	_____

31. Rank the 4 most important problems in retention of personnel. Do this for each job category. (Use #1 for most important, #2 for second, #3 for third, #4 for fourth)

Problems in Retention	Skilled Prod. Wkrs.	Management Personnel	Sales Personnel
(Rank All 4)	(Rank All 4)	(Rank All 4)	(Rank All 4)
1 Unable to get along .....	_____	_____	_____
2 Unable to adapt to retraining .....	_____	_____	_____
3 Poor knowledge/skill ability .....	_____	_____	_____
4 Poor wage scale compatible with other industries/businesses .....	_____	_____	_____

32. How many total employees (full and part-time) presently work at your plant site? (Circle a number: 1-8)

1-10	11-20	21-50	51-100	101-250	251-500	501-1000	1001 +
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

33. Indicate the approximate percent of production time devoted to each process used at your plant site. Then circle a number [1-3] indicating whether the percent has Decreased, Not Changed, or Increased, since the Fall of 1983 (last 5 years).

Printing Processes	Percent of Time Used	De-creased	Not Changed	In-creased
1 Lithography (offset) .....	_____	1	2	3
2 Letterpress .....	_____	1	2	3
3 Screen process .....	_____	1	2	3
4 Flexography .....	_____	1	2	3
5 Gravure .....	_____	1	2	3
6 Letterset .....	_____	1	2	3
7 Electrostatic .....	_____	1	2	3
8 Other (specify) .....	_____	1	2	3

TOTAL 100%

OVER →



Please indicate any questions or comments you may have regarding this study or about any of the questions in this opinionnaire.

---

(FOLD, CREASE TIGHTLY, AND MAIL)

**THANK YOU FOR YOUR COOPERATION AND PROMPT RESPONSE!**

Please return this opinionnaire post-marked on or before \_\_\_\_\_ in the enclosed return envelope to:

John F. Gindele, Research Director  
1939 College Street, Apt. 235  
P.O. Box 1108  
Cedar Falls, Iowa 50613-1108

If you would like a summary of the results of the research, please complete the information on the enclosed **gold form** and return it with the completed opinionnaire. You will receive a copy after the research is completed.

## COVER LETTER TO MANUFACTURERS



**University of Northern Iowa**

**Department of Industrial Technology**

Industrial Technology Center  
Cedar Falls, Iowa 50614  
Phone (319) 273-2561

November 1, 1988

Dear Graphic Arts Manufacturer (Personalized):

What is happening to Iowa's graphic arts industry? Rapid technological changes are impacting its workforce! A decline in the number of workers entering the labor market is projected, and shortages of skilled, management, and sales personnel are purported to already exist!

The effects these factors are having statewide are not known. We especially do not know the opinions of Iowa graphic arts manufacturers regarding employment trends and related issues. That is why we are asking you to fill out the enclosed short opinionnaire, or route it to the individual best qualified to do so. Working cooperatively to address these concerns, this doctoral research is endorsed by industry (PIM, GATF, Iowa's Craftsmen Clubs) and education (IGAEA, Iowa Department of Education, UNI).

You have been chosen as part of a select group to be a cross section of small and large companies covering all areas of graphic arts specialization. Your responses will be used to help graphic arts manufacturers and educators in identifying and meeting current and future employment needs of the industry. The data should help educators in upgrading their curriculum and provide students better career guidance.

The findings will be thoroughly analyzed, discussed, and reported, and hopefully will be useful to officials in industry, trade associations, and governmental agencies. A summary will be made available to you.

Your responses will be kept completely confidential. To keep track of returns, only numbers are used on the opinionnaire rather than names.

We hope you will find the study interesting and that you will complete it while you have it at hand. For your convenience in replying, an addressed return envelope is enclosed. Please call if you have any questions or comments about the study.

Sincerely,

John F. Gindele, Doctoral Candidate  
Member of GATF, IGAEA, PIM, and  
Waterloo Craftsman's Club  
(319) 277-4247

James R. Frey, President  
Printing Industries of  
the Midlands, Inc.  
(800) 234-7427

P.S. The enclosed crisp dollar bill is a token of my appreciation.



GRAPHIC ARTS  
TECHNICAL FOUNDATION

1000 AURORA AVENUE  
DES MOINES, IOWA 50322  
(515) 270-1009 or 1-800-234-7427

September 1988

Dear Members of the Graphic Arts Industry:

Re: Research Study Survey

The Printing Industries of the Midlands, Inc. (PII), is cooperating with John P. Gindole, Project Director, of the University of Northern Iowa in a research study. John is conducting the survey as part of his re-titled the Employment Needs of Industrial Technology at UNI. The research study is approximately 33% of printing and graphic arts companies will be included in the sampling process. If you receive one of the survey instruments I would like to ask that you complete it. All high school and post-secondary graphic arts educators will also be surveyed.

A statewide study of this type has never been undertaken before. All concerned groups have an interest in identifying the future employment needs of the graphic arts industry. The results of this study will be beneficial to all printing companies, graphic arts schools and suppliers to the industry.

Thanks for your cooperation and participation in the survey.

Sincerely,  
*Jim Gray*  
James R. Gray  
President

JRG/hb

\*Strong the Printing Industry of Iowa, Nebraska and South Dakota\*

Mr. John Gindole  
1935 College Street, Apt. 235  
Cedar Falls, IA 50613

Dear John,

Your doctorate dissertation dealing with employment needs in the graphic arts industry in Iowa will be of major importance for your State, and perhaps it will stimulate as you know, it is extremely important for the graphic arts industry and Iowa will be a major gain from the short time they will invest in completing the questionnaire. I am this major gain from the short time they will invest in completing the questionnaire. I am this major gain from the short time they will invest in completing the questionnaire.

John, I fully support your study; not only will it benefit the graphic arts industry in Iowa, but in your State perhaps the Iowa graphic arts education will receive a copy of your results. I would appreciate receiving a copy of your results. I would appreciate receiving a copy of your results.

Sincerely,  
*Jack Stelmach*  
Jack Stelmach  
Education Director

J5/88

UNIVERSITY OF IOWA • IOWA STATE UNIVERSITY • IOWA STATE UNIVERSITY • IOWA STATE UNIVERSITY • IOWA STATE UNIVERSITY

# ENDORSEMENTS

## GIFT CERTIFICATE

-OVER-	<p><b>G I F T C E R T I F I C A T E</b></p> <p>RETURN THE COMPLETED OPINIONNAIRE POST-MARKED ON OR BEFORE _____, 1988 TO BE ELIGIBLE FOR <u>TWO</u> DRAWINGS TO WIN \$ 25.00 EACH.</p> <p>Print your name and address on the BACK of this form and return it with the completed opinionnaire in the enclosed postage-paid envelope.</p>
-OVER-	<p><b>INFORMATION FORM--Check ALL that Apply:</b></p> <p>_____ Please enter my name in your drawings.</p> <p>_____ Please send me your Survey Results.</p> <p>Please Name: _____ Type or Letter: Title: _____</p> <p>Organization: _____</p> <p>Street Address: _____</p> <p>City/State/Zip: _____</p> <p>(Must be post-marked by date on reverse side to be eligible)</p>

## THANK YOU/FOLLOW-UP REMINDER POSTCARD FOR MANUFACTURERS

November 8, 1988

Dear (Personalized):

Last week an opinionnaire seeking your views about the employment needs of Iowa's graphic arts industry was mailed to you. Your name was drawn in a random sample of Iowa manufacturers.

If you have already completed and returned it, please consider this card a "Thank You" for your valuable help.

If you have not had a chance to do so as yet, may I ask you to return the completed form now? Because it has been sent to only a small, but representative sample of large and small companies it is extremely important that you also be included in the study if the results are to accurately represent the opinions of your special interest group. Your participation is vital to the success of this study. Thank you again!

John Gindele, Doctoral Candidate  
University of Northern Iowa  
Department of Industrial Technology

## SECOND FOLLOW-UP LETTER TO MANUFACTURERS



**University of Northern Iowa**

**Department of Industrial Technology**

Industrial Technology Center  
Cedar Falls, Iowa 50614  
Phone (319) 273-2561

November 21, 1988

Dear Graphic Arts Manufacturer (Personalized):

We've been tabulating the returns of our opinionnaire on the employment needs of Iowa's graphic arts industry and we noted that we had not received a reply from you. We know that we are asking you to do us a favor, but we really would appreciate hearing from you.

Does it really matter if you complete the opinionnaire? Yes, definitely! You are part of a scientifically selected cross-section of Iowa graphic arts manufacturers representing all areas of specialization and company sizes. If we are to get a clear picture of what this special interest group really has to say about the needs, trends, and issues facing the industry, we need to hear from every person in the study sample.

Leaders in Iowa's printing industry as well as graphic arts educators need to know what the employment needs are and a survey is the only way to get a truly representative picture. Your input in the study will provide us important information on where the industry currently is and where it is heading that just cannot be obtained in another way. It will also provide us with some basic demographics and employment practices.

Thus, we hope that you will spend a few minutes to complete this opinionnaire. Again, you can be assured that we will keep your responses completely confidential. As soon as we hear from you we will remove your name from our mailing list.

We would be happy to talk to you about the study if you wish to call collect at (319) 277-4247, or dial 800 234-7427. A printed summary will be made available to you if you indicate it on the enclosed gold form.

Thanks again for your cooperation.

Sincerely,

John F. Gindele, Doctoral Candidate  
Member of GATF, IGAEA, PIM, TAGA,  
and the Waterloo Craftsman's Club

James R. Frey, President  
Printing Industries of  
the Midlands, Inc.

P.S. Possibly the original request went astray in the mail. Therefore, I am enclosing another form with a packet of Sanka to serve as a token of appreciation.

## THIRD FOLLOW-UP LETTER TO MANUFACTURERS



**University of Northern Iowa**  
**Department of Industrial Technology**

Industrial Technology Center  
 Cedar Falls, Iowa 50614  
 Phone (319) 273-2681

December 13, 1988

Dear Graphic Arts Manufacturer (Personalized):

We are writing to you about our study of manufacturers' opinions of the Employment Needs of Iowa's Graphic Arts Industry. We have not yet received your completed opinionnaire.

The large number of opinionnaires returned is very encouraging. But whether we will be able to describe accurately what graphic arts manufacturers have to say about their employment needs and issues depends upon you and others who have not yet responded. This is because our past experiences suggest that those of you who have not yet sent in your opinionnaires may hold quite different views regarding current and future needs of the industry, as well as opinions on selected issues and employment practices, than those who have.

This is the first statewide study of this type that has ever been done. Therefore, the results are of particular importance to officials in the industry, trade associations, and employment placement agencies, as well as graphic arts educators in Iowa schools who are attempting to address the needs of the industry. The usefulness of our results depends on how accurately we are able to describe what graphic arts manufacturers want.

It is for these reasons that we are sending this follow-up letter. In case our other correspondence did not reach you, a replacement opinionnaire is enclosed. May we urge you to complete and return it as soon as possible?

We'll be happy to send you a copy of the results if you want one. Just complete the enclosed gold form and return it to us with the completed opinionnaire. We expect to have them ready to send as soon as the study is completed.

Your completing and returning the opinionnaire will contribute to the success of this study. It will be greatly appreciated.

Most sincerely,

John F. Gindele, Doctoral Candidate  
 Member of GATF, IGAEA, PIM, TAGA,  
 Waterloo Craftsman's Club  
 (319) 277-4247

James R. Frey, President  
 Printing Industries of  
 the Midlands, Inc.  
 (800) 234-7427

P.S. Please accept this second packet of Sanka decaffeinated coffee as a token of my appreciation.

## APPENDIX C

## MATERIALS SENT TO EDUCATORS

1. PRENOTIFICATION POSTCARD
2. OPINIONNAIRE
3. COVER LETTER
4. ENDORSEMENT LETTERS
5. GIFT INCENTIVE
6. THANK YOU/FOLLOW-UP POSTCARD
7. SECOND FOLLOW-UP LETTER
8. THIRD FOLLOW-UP LETTER



## PRE-NOTIFICATION POSTCARD

October 25, 1988

Dear (Personalized):

I am asking your help in a statewide research project.

Important issues have been raised by manufacturers and educators concerning the demand for qualified personnel in Iowa's graphic arts industry.

In a few days you will receive an "employment needs" opinionnaire which should take but a few minutes to complete.

I would appreciate your cooperation in completing and returning this short form.

Sincerely,

John Gindele, Doctoral Candidate  
University of Northern Iowa  
Department of Industrial Technology

Code: \_\_\_\_\_  
(For follow-up purposes ONLY)

# Employment Needs of Iowa's Graphic Arts Industry\*

## Educators' Opinionnaire

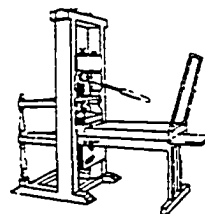
Your opinion is needed regarding employment trends and issues concerning the demand for graphic arts personnel in Iowa. The information will be used to help graphic arts educators and manufacturers identify and meet current and future employment needs of the industry.

The opinionnaire should take approximately 20 minutes to complete.

Your responses will be kept strictly confidential. Please answer all questions.

**Your assistance in completing this opinionnaire will be very valuable for my research!**

John F. Gindele, Research Director  
Candidate, Doctor of Industrial Technology  
Department of Industrial Technology  
University of Northern Iowa  
Cedar Falls, Iowa 50614-0178



\*Endorsed by the International Graphic Arts Association (IGAEA), Iowa Department of Education (Career Information Systems), Craftsmens Clubs of Des Moines, Iowa City, Omaha, and Waterloo, Graphic Arts Technical Foundation (GATF), and the Printing Industries of the Midlands (PIM).

Definitions

To assist in the completion of this opinionnaire, the following definitions are provided for use in this study.

**Demand.** The need of industry for workers as a result of expansion or replacement.

**Skilled workers.** Company employees (from trainees through experienced craftspeople) who have the special skills necessary to handle materials and operate specialized equipment.

**Management Personnel.** Company employees with executive ability whose responsibilities are to control and direct people and the operations within a department.

**Sales Personnel.** Company employees responsible for selling all phases of printing, and generally serve as technical or customer relations representatives between the customer (buyer) and the company (seller).

**Graphic Arts.** The area of technology in which printed products are produced. Graphic Arts is sometimes referred to as GRAPHIC COMMUNICATIONS, COMMUNICATIONS TECHNOLOGY, PRINTING, VISUAL COMMUNICATIONS.

### I. Perceived Demand for Personnel Iowa-Wide

In Column I below is a list of General Employee Functions regarding skilled, management, and sales personnel usually found in graphic arts plants.

- Directions: 1. Circle the number in Column II that expresses YOUR opinion as to the current demand for these workers in the industry. **Please consider Iowa's Graphic Arts Industry as a Whole.**
2. Circle the number in Column III that expresses YOUR opinion as to the demand for these workers in five years (1993).

Example:

Employee Functions	(II) Current Demand				(III) Demand In 5 Years			
	None 1	Low 2	Moderate 3	High 4	None 1	Low 2	Moderate 3	High 4
Color scanner operations	1	2	③	4	1	2	3	④

In this example, the respondent believes there is currently a "moderate demand" (3) for color scanner operators in Iowa, and will be a "high demand" (4), in five years.

Please respond to each item. Thank You!

Employee Functions	(II) Statewide Current Demand				(III) Statewide Demand in 5 Years			
	None 1	Low 2	Moderate 3	High 4	None 1	Low 2	Moderate 3	High 4
<b>SKILLED PRODUCTION WORKERS</b>								
<b>1. Design and Layout</b>								
1 Creative designer .....	1	2	3	4	1	2	3	4
2 Illustrator .....	1	2	3	4	1	2	3	4
3 Layout-copy mark-up .....	1	2	3	4	1	2	3	4
4 Copy writer .....	1	2	3	4	1	2	3	4
5 Photographer .....	1	2	3	4	1	2	3	4
<b>2. Typesetting and Copy Preparation</b>								
1 Hot metal .....	1	2	3	4	1	2	3	4
2 Strike-on .....	1	2	3	4	1	2	3	4
3 Phototypesetting .....	1	2	3	4	1	2	3	4
4 Electronic image assembly .....	1	2	3	4	1	2	3	4
5 Satellite Telecommunications .....	1	2	3	4	1	2	3	4
6 Editing/proofreading .....	1	2	3	4	1	2	3	4
7 Paste-up .....	1	2	3	4	1	2	3	4

Employee Functions	Statewide Current Demand				Statewide Demand in 5 Years			
	None	Low	Moderate	High	None	Low	Moderate	High
<b>3. Pre-Press Operations</b>								
1 Black & white camera .....	1	2	3	4	1	2	3	4
2 Process color camera .....	1	2	3	4	1	2	3	4
3 Color scanner .....	1	2	3	4	1	2	3	4
4 Black & white stripping .....	1	2	3	4	1	2	3	4
5 Process color stripping .....	1	2	3	4	1	2	3	4
Platemaking Operations								
6 Lithography .....	1	2	3	4	1	2	3	4
7 Letterpress .....	1	2	3	4	1	2	3	4
8 Screen process .....	1	2	3	4	1	2	3	4
9 Flexography .....	1	2	3	4	1	2	3	4
10 Gravure .....	1	2	3	4	1	2	3	4
<b>4. Pressroom Operations</b>								
Lithography								
1 Sheet (under 17 x 22) .....	1	2	3	4	1	2	3	4
2 Sheet b & w (over 17 x 22) .....	1	2	3	4	1	2	3	4
3 Sheet all color (over 17 x 22) .....	1	2	3	4	1	2	3	4
4 Web, black & white .....	1	2	3	4	1	2	3	4
5 Web, all color .....	1	2	3	4	1	2	3	4
Other Processes								
6 Letterpress .....	1	2	3	4	1	2	3	4
7 Screen process .....	1	2	3	4	1	2	3	4
8 Flexography .....	1	2	3	4	1	2	3	4
9 Gravure .....	1	2	3	4	1	2	3	4
<b>5. Binding/Finishing Operations</b>								
1 Hand/small machines .....	1	2	3	4	1	2	3	4
2 Cutter .....	1	2	3	4	1	2	3	4
3 Folder .....	1	2	3	4	1	2	3	4
4 Automated gather/stitch/trim .....	1	2	3	4	1	2	3	4

**MANAGEMENT PERSONNEL**

6. Plant Administration (e.g., office and finance operations, safety and environmental control, etc.) .....	1	2	3	4	1	2	3	4
7. Production Management (e.g., job planning, scheduling, production, material, quality control, etc.) .....	1	2	3	4	1	2	3	4
8. Personnel Management (e.g., training, labor relations, recruiting, etc.) .....	1	2	3	4	1	2	3	4

**SALES PERSONNEL**

9. Estimator .....	1	2	3	4	1	2	3	4
10. Sales (e.g., customer relations and service, technical rep., etc.) .....	1	2	3	4	1	2	3	4

## II. Iowa Graphic Arts Issues

11. Circle a number [1-3] for each area indicating if there has been a **Decrease**, **Little Change**, or **Increase** in skill or technical knowledge required for the job today as compared to the last five years (Fall 1983).

		Changes in Skill/Technical Knowledge Required in the Last 5 Years		
		Decrease	Little Change	Increase
<b>Employment Areas</b>				
<b>Skilled Production Workers</b>				
1	Design and Layout .....	1	2	3
2	Typesetting & Copy Preparation .....	1	2	3
<b>Pre-Press Operations</b>				
3	Camera, b & w .....	1	2	3
4	Camera, color separation .....	1	2	3
5	Scanner separation .....	1	2	3
6	Proofing, b & w .....	1	2	3
7	Proofing, color .....	1	2	3
8	Stripping/platemaking .....	1	2	3
9	Pressroom .....	1	2	3
10	Binding/Finishing .....	1	2	3
11	Management Personnel .....	1	2	3
12	Sales Personnel .....	1	2	3

12. How will automation affect the need for skilled production workers? (Circle a number):  
 (1) Less Wkrs. Needed                      (2) No Change                      (3) More Wkrs. Needed

Circle the level of agreement [1-4] describing the extent you agree or disagree with each of the following statements:

13. Of the following employee groups in Iowa's graphic arts industry, there is an adequate supply of:

	Strongly Disagree	Disagree	Agree	Strongly Agree
1 Skilled production workers.....	1	2	3	4
2 Management personnel.....	1	2	3	4
3 Sales personnel .....	1	2	3	4

14. Tomorrow's needs of Iowa's graphic arts industry will be met by today's graphic arts educ. programs in Iowa's:

	Strongly Disagree	Disagree	Agree	Strongly Agree
1 High schools .....	1	2	3	4
2 Vocational high schools .....	1	2	3	4
3 Post-secondary voc/tech schools.....	1	2	3	4
4 Colleges and universities.....	1	2	3	4

The graphic arts industry should...

15. Set aside funds to be used to upgrade graphic arts equipment in Iowa's:

	Strongly Disagree	Disagree	Agree	Strongly Agree
1 High schools .....	1	2	3	4
2 Vocational high schools .....	1	2	3	4
3 Post-secondary voc/tech schools.....	1	2	3	4
4 Colleges and universities.....	1	2	3	4

16. Offer free training sessions to graphic arts educators to help upgrade their tech. skills/knowledge..... 1 2 3 4

17. Offer Internships to graphic arts students/educators interested in upgrading their skills and knowledge ..... 1 2 3 4

### III. Characteristics of Educators, Their Activities, and Programs

18. Please indicate your age in years since your last birthday. (Circle a number: 1-8)

20-24	25-29	30-34	35-39	40-44	45-49	50-54	55 +
1	2	3	4	5	6	7	8

19. What is your highest level of educational attainment. (Circle a number: 1-7)

H.S. Diploma	Voc./Tech. Certificate	Assoc. Degree	Bachelor Degree	Master Degree	Doctor Degree	Other Specify:	_____
1	2	3	4	5	6	7	

20. Please indicate your type of institution. (Circle a number: 1-6)

General H.S. (gr. 9-12)	Voc. H.S. (gr. 9-12)	Voc./Tech. Institute	2-Yr. Comm. College	4-Yr. College University	Other (Specify:	_____
1	2	3	4	5	6	

21. Prior to the 1988-89 school year, how many years have you:

1 taught graphic arts? \_\_\_\_\_ Years

2 taught totally? \_\_\_\_\_ Years

22. Other than teaching, have you had any work experience (full or part-time) in graphic arts? (Circle Yes or No, fill in)

1 Yes How many years? : \_\_\_\_\_

2 No

23. Rank three (3) most important methods you used during the past two years to keep pace with developments in graphic arts. (Place #1 on the line to rank how you most often learn about graphic arts. Use #2 and #3 for the second and third rankings).

Rank ONLY 3 of the following nine.

1 \_\_\_\_\_ Work experience in a graphic arts-related company

2 \_\_\_\_\_ College or vocational coursework

3 \_\_\_\_\_ Seminars/workshops/in-service training

4 \_\_\_\_\_ Conferences/trade exhibits

5 \_\_\_\_\_ Trade journals/magazines

6 \_\_\_\_\_ Vendor/technical rep. contact

7 \_\_\_\_\_ Associations/organizations

8 \_\_\_\_\_ Field trips

9 \_\_\_\_\_ Other (specify: \_\_\_\_\_)

24. To what degree are job opportunities emphasized when discussing employee groups with your students? (Circle a number [1-4] for each group)

Employee Groups	None	Mentioned Briefly	Average Coverage	Considerable Coverage
1 Skilled production workers	1	2	3	4
2 Management personnel	1	2	3	4
3 Sales personnel	1	2	3	4

25. How often do you update your graphic arts curriculum? (Circle a number: 1-4)

Every Year	Every Two Years	Every Three to Five Yrs.	Longer Than Five Yrs.
1	2	3	4

26. Circle a number [1-3] to describe student enrollment changes in your graphic arts program(s) during the past three (3) years.

- (1) Increased                      (2) Decreased                      (3) No Change

Choose Question 27, 28 or 29 as it applies to your instructional level and circle a number [1-5] for the general degree of support (financial, moral, or otherwise) your graphic arts program receives.

	Degree of Support				
	Don't know	None	Little	Moderate	High

27. For Secondary School Educators:

1	Guidance counselors .....	1	2	3	4	5
2	Principal/ass't principal .....	1	2	3	4	5
3	Fellow technology educ. tchrs. ....	1	2	3	4	5
4	Fellow tchrs. of other disciplines .....	1	2	3	4	5
5	Board of educ. members .....	1	2	3	4	5
6	School superintendent .....	1	2	3	4	5
7	General Public .....	1	2	3	4	5

28. For Post-Secondary Voc/Tech Educators:

1	Department colleagues .....	1	2	3	4	5
2	Department head .....	1	2	3	4	5
3	Top level administrators .....	1	2	3	4	5

29. For College/University Educators:

1	Department colleagues .....	1	2	3	4	5
2	Department head .....	1	2	3	4	5
3	Dean .....	1	2	3	4	5
4	Top level administrators .....	1	2	3	4	5

Please circle numbers of all that apply and legibly fill in your responses indicating changes in your graphic arts curriculum.

30. What changes have occurred in the past three years?

(1) No changes occurred.

(2) Course content was changed. Please specify.

(3) Courses were added. Please specify.

(4) Courses were deleted. Please specify.

31. What changes will occur in the next three years?

(1) No changes are foreseen.

(2) Course content will change. Please specify.

(3) Courses will be added. Please specify.

(4) Courses will be deleted. Please specify.

**Thank you for participating in this research!**

**Please see note on back page for returning this opinionnaire...**



Please indicate any questions or comments you may have regarding this study or about any of the questions in this opinionnaire.

---

(FOLD, CREASE TIGHTLY, AND MAIL)

**THANK YOU FOR YOUR COOPERATION AND PROMPT RESPONSE!**

Please return this opinionnaire post-marked on or before \_\_\_\_\_ in the enclosed return envelope to:

John F. Gindele, Research Director  
1939 College Street, Apt. 235  
P.O. Box 1108  
Cedar Falls, Iowa 50613-1108

If you would like a summary of the results of the research, please complete the information on the enclosed gold form and return it with the completed opinionnaire. You will receive a copy after the research is completed.

## COVER LETTER TO EDUCATORS



**University of Northern Iowa**  
**Department of Industrial Technology**

Industrial Technology Center  
 Cedar Falls, Iowa 50614  
 Phone (319) 273-2561

November 1, 1988

Dear Graphic Arts Educator (Personalized):

What is happening to Iowa's graphic arts industry? Rapid technological changes are impacting its workforce! A decline in the number of workers entering the labor market is projected, and shortages of skilled, management, and sales personnel are purported to already exist!

The effects these factors are having statewide are unclear. The opinions of Iowa graphic arts educators regarding employment trends and related issues are especially not known. That is why I am asking you to complete the enclosed short opinionnaire. Working cooperatively to address these concerns, this doctoral research is endorsed by education (IGAEA, Iowa Department of Education, University of Northern Iowa) and industry (PIM, GATF, Iowa's Craftsmen Clubs).

You have been chosen as part of a select group of graphic arts educators covering many levels of instruction. Your responses will be used to help graphic arts educators and manufacturers in identifying and meeting current and future employment needs of the industry.

The findings will be thoroughly analyzed, discussed, and reported, and hopefully will be useful to officials in industry, trade associations, and governmental agencies. The data should help educators in upgrading their curriculum and provide students better career guidance. A summary will be made available to you.

Your responses will be kept completely confidential. To keep track of returns, only numbers are used on the opinionnaire rather than names.

I hope you will find the study interesting and that you will complete it while you have it at hand. For your convenience in replying, an addressed return envelope is enclosed. Please call if you have any questions or comments about the study.

Sincerely,

Approved:

John F. Gindele, Doctoral Candidate,  
 Member of GATF, IGAEA, PIM, and  
 Waterloo Craftsman's Club  
 (319) 277-4247

Ervin A. Dennis, Ed.D.,  
 Professor and Advisor  
 Member of GAA, GATF, IGAEA,  
 Waterloo Craftsman's Club  
 (319) 273-2753

P.S. The enclosed crisp dollar bill is a token of my appreciation.

625 Park Avenue  
 Pittsburgh, PA 15213  
 412 642 8170

**IGAABA**  
 International Graphic Arts Association  
 Educational and Technical Foundation

August 1988

Dear Iowa Graphic Arts Educator:

Ref: Research Study Opinionnaire


The International Graphic Arts Education Association and Graphic Arts Technical Foundation is cooperating with John F. In a Project Director, of the University of Northern Iowa in a research study. John is conducting the study entitled "Employment Needs of the Graphic Arts Industry in Iowa, as Part of His Doctoral Research through the Department of Industrial Technology."

All 70 Iowa high school (grades 9-12), vocational/technical, community college, and four college/university graphic arts educators will be included in the sampling process. A complete list of 75 percent of Iowa's print and graphic arts companies will also be included. When you receive the opinionnaire, it would like to see that you complete the opinionnaire, it is as soon as possible.

A statewide study of this type has never been undertaken before in Iowa.

All concerned groups have an interest in identifying the future employment needs of the graphic arts industry. The results of this study will be beneficial to all graphic arts educators as well as printing company personnel and suppliers to the industry.

Thank you for your cooperation and participation in the study.

Sincerely,  
  
 Virgil Pufank  
 President

GAATE  
 GRAPHIC ARTS TECHNICAL FOUNDATION  
 1515 College Street, Apr. 235  
 Cedar Falls, IA 50613


April 3, 1988

Mr. John Glendle  
 1515 College Street, Apr. 235  
 Cedar Falls, IA 50613

Dear John:

Your doctorate dissertation dealing with employment needs in the graphic arts industry in Iowa will be of major importance for your State and perhaps it such a study, and to your opinionnaire, will be extremely important for the graphic arts industry and Iowa as a whole. I am confident that you will invest in and support this major undertaking. The short time they will invest in completing the opinionnaire.

John, I fully support your study; not only will it benefit the graphic arts industry and education in our State, I would appreciate receiving a copy of your results. Perhaps the Iowa study will set the pace for other States to follow suit.

Sincerely,  
  
 Jack Stalich  
 Education Director

JIS/ab

**ENDORSEMENTS**

GIFT CERTIFICATE

**-OVER-**

**G I F T C E R T I F I C A T E**

RETURN THE COMPLETED OPINIONNAIRE POST-MARKED  
ON OR BEFORE \_\_\_\_\_, 1988 TO BE ELIGIBLE FOR  
TWO DRAWINGS TO WIN \$ 25.00 EACH.

Print your name and address on the BACK of this  
form and return it with the completed opinionnaire  
in the enclosed postage-paid envelope.

**-OVER-** INFORMATION FORM--Check ALL that Apply:

\_\_\_\_\_ Please enter my name in your drawings.

\_\_\_\_\_ Please send me your Survey Results.

Please Name: \_\_\_\_\_  
Type or Letter: Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Street Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

(Must be post-marked by date on reverse side to be eligible)

## THANK YOU/FOLLOW-UP REMINDER POSTCARD FOR EDUCATORS

November 8, 1988

Dear (Personalized):

Last week an opinionnaire seeking your views about the employment needs of Iowa's graphic arts industry was mailed to you. Your name was drawn in a random sample of Iowa graphic arts educators.

If you have already completed and returned it, please consider this card a "Thank You" for your valuable help.

If you have not had a chance to do so as yet, may I ask you to return the completed form now? Because the number of graphic arts educators in Iowa is limited, it is extremely important that you also be included in the study if the results are to accurately represent the opinions of your special interest group. Your participation is vital to the success of this study. Thank you again!

John Gindele, Doctoral Candidate  
University of Northern Iowa  
Department of Industrial Technology

## SECOND FOLLOW-UP LETTER TO EDUCATORS



**University of Northern Iowa**  
**Department of Industrial Technology**

Industrial Technology Center  
 Cedar Falls, Iowa 50614  
 Phone (319) 273-2561

November 21, 1988

Dear Graphic Arts Educator (Personalized):

We've been tabulating the returns of our opinionnaire on the employment needs of Iowa's graphic arts industry and we noted that we had not received a reply from you. We know that we are asking you to do us a favor, but we really would appreciate hearing from you.

Does it really matter if you complete the opinionnaire? Yes, definitely! You are part of a scientifically selected cross-section of Iowa graphic arts educators serving all levels of instruction. If we are to get a clear picture of what this professional special interest group really thinks about the employment trends and issues of the industry, and identify general characteristics of educators, their activities and programs, we need to hear from every person in the study sample.

Leaders in graphic arts education as well as the printing industry need to know what all graphic arts educators think about graphic arts employment and a survey is the only way to get a truly representative picture. Your input in the study will provide important information used in identifying and meeting current and future employment needs, upgrade curriculum, and provide for better career guidance that cannot be obtained in another way.

Thus, we hope that you will spend a few minutes to complete this opinionnaire. Again, you can be assured that we will keep your responses completely confidential. As soon as we hear from you we will remove your name from our mailing list.

We would be happy to talk to you about the study if you wish to call collect at (319) 277-4247. A printed summary will be made available to you if you indicate it on the enclosed gold form.

Thanks again for your cooperation.

Sincerely,

Approved

John F. Gindele, Doctoral Candidate  
 and Graphic Arts Teacher  
 Member of GATF, IGAEA, PIM, TAGA,  
 and the Waterloo Craftsman's Club

Ervin A. Dennis, Ed.D.  
 Professor and Advisor  
 Member of GAA, GATF, IGAEA,  
 Waterloo Craftsman's Club  
 (319) 273-2753

P.S. Possibly the original request went astray in the mail. Therefore, I am enclosing another form with a packet of Sanka to serve as a token of appreciation.

## THIRD FOLLOW-UP LETTER TO EDUCATORS



**University of Northern Iowa**

**Department of Industrial Technology**

Industrial Technology Center  
Cedar Falls, Iowa 50614  
Phone (319) 273-2561

December 13, 1988

Dear Graphic Arts Educator (Personalized):

We are writing to you about our study of educators' opinions of the Employment Needs of Iowa's Graphic Arts Industry. We have not yet received your completed opinionnaire.

The large number of opinionnaires returned is very encouraging. But whether we will be able to describe accurately what Iowa graphic arts educators have to say about employment trends and issues depends upon you and others who have not yet responded. This is because our past experiences suggest that those of you who have not yet sent in your opinionnaires may hold quite different views regarding current and future needs of the industry, as well as opinions on selected issues, and characteristics of graphic arts programs, than those who have.

This is the first statewide study of this type that has ever been done. Therefore, the results are of particular importance to all levels of Iowa graphic arts educators, placement/career specialists, and members of the Department of Industrial Technology at UNI who are attempting to update their curricula and provide students better career guidance to meet the needs of the industry. The usefulness of our results depends on how accurately we are able to describe the views of all graphic arts educators.

It is for these reasons that we are sending this follow-up letter. In case our other correspondence did not reach you, a replacement opinionnaire is enclosed. May we urge you to complete and return it as soon as possible?

We'll be happy to send you a copy of the results if you desire one. Just complete the enclosed gold form and return it with the completed opinionnaire. We expect to have them ready to send as soon as the study is completed.

Your completing and returning the opinionnaire will contribute to the success of this study. It will be greatly appreciated!

Most sincerely,

Approved

John F. Gindale, Doctoral Candidate  
and Graphic Arts Teacher  
Member of GATF, IGAEA, PIM, TAGA,  
and Waterloo Craftsman's Club  
(319) 277-4247

Ervin A. Dennis, Ed.D.  
Professor and Advisor  
Member of GAA, GATF, IGAEA,  
and Waterloo Craftsman's Club  
(319) 273-2753

P. S. Please accept this second packet of Sanka decaffeinated coffee as a token of my appreciation.

APPENDIX D

PRINTING, PUBLISHING, AND ALLIED

INDUSTRIES: MAJOR GROUP 27







STANDARD INDUSTRIAL CLASSIFICATION

MANUFACTURING

- |   |                                    |   |  |                                    |   |
|---|------------------------------------|---|--|------------------------------------|---|
| <p>Industry Group No<br/><b>276</b></p> | <p>Industry No<br/><b>2761</b></p> | <p><b>MANIFOLD BUSINESS FORMS—Con.</b><br/><b>Manifold Business Forms—Con.</b><br/>Alphanumeric forms, printed<br/>Alphanumeric forms, manifold<br/>Computer forms, manifold or continuous<br/>Continuous forms, perforated<br/>Continuous forms, office and business<br/>calculated or multiple reproduction</p>   | <p>Industry Group No<br/><b>279</b></p>  | <p>Industry No<br/><b>2791</b></p> | <p><b>SERVICE INDUSTRIES FOR THE PRINTING TRADE</b><br/><b>Typesetting</b><br/>Establishments primarily engaged in typesetting for the trade, including advertisement typesetting.<br/>Advertisement typesetting<br/>Composition, hand for the printing trade<br/>Galleying<br/>Galleys<br/>Monotype— for the printing trade<br/>Photocomposition<br/>Typesetting for the printing trade<br/>Typesetting computer controlled<br/>Typographic composition</p>  |
| <p>Industry Group No<br/><b>277</b></p> | <p>Industry No<br/><b>2771</b></p> | <p><b>GREETING CARDS</b><br/><b>Greeting Cards</b><br/>Establishments primarily engaged in publishing, printing by any process, or both, of greeting cards for all occasions. Establishments primarily engaged in producing hand printed greeting cards are classified in Services, Industry 8999.<br/>Birthday cards, except hand printed<br/>Christmas cards, except hand printed<br/>Easter cards, except hand printed</p>   | <p>Industry Group No<br/><b>2796</b></p> | <p>Industry No<br/><b>2796</b></p> | <p><b>Platemaking and Related Services</b><br/>Establishments primarily engaged in making plates for printing purposes and in related services. Also included are establishments primarily engaged in making positives or negatives from which offset lithographic plates are made. These establishments do not print from the plates which they make, but prepare them for use by others. Engraving for purposes other than printing is classified in Industry 3479.<br/>Color separations for printing<br/>Electrotype plates<br/>Engraving plates for printing<br/>Engraving on copper, steel, wood, or zinc<br/>Engraving on metal printing plate and cylinders<br/>Engraving, steel line for printing purposes<br/>Engraving on copper, steel, wood, or rubber plates for printing purposes<br/>Photographic plates, preparation of<br/>Gravure plates and cylinders, preparation of</p>             |
| <p>Industry Group No<br/><b>278</b></p> | <p>Industry No<br/><b>2782</b></p> | <p><b>BLANKBOOKS, LOOSELEAF BINDERS, AND BOOKBINDING AND RELATED WORK</b><br/><b>Blankbooks, Looseleaf Binders and Devices</b><br/>Establishments primarily engaged in manufacturing blankbooks, looseleaf devices, and library binders; and in ruling paper.<br/>Account books<br/>Albums<br/>Binders, looseleaf<br/>Blankbook making<br/>Checkbooks and check paper, ruled<br/>Checkbooks<br/>Diaries<br/>Inventory blankbooks<br/>Ledgers and index books<br/>Library binders, looseleaf</p> | <p>Industry Group No<br/><b>2789</b></p> | <p>Industry No<br/><b>2789</b></p> | <p><b>Bookbinding and Related Work</b><br/>Establishments primarily engaged in edition, trade, job, and library bookbinding. Also included in this industry are establishments primarily engaged in book or paper bronzing, gilding, and edging; in map and sample mounting; and in other services related to bookbinding. Establishments primarily binding books printed elsewhere are classified in this industry, but those primarily binding books printed in the same establishment are classified in Industry Group 273.<br/>Binding of cards<br/>Binding only: books, pamphlets, magazines, etc.<br/>Bookbinding, bronzing, edging, deckling, embossing, and gold stamping<br/>Bookbinding edition, job, library, and trade<br/>Bookbinding books, cards, or paper<br/>Bookbinding<br/>Edging books, cards, or paper<br/>Magazine binding only<br/>Mounting of maps and samples, for the trade</p> |

APPENDIX E

TIMELINE FOR COMPLETING THE STUDY

Table E-1

Timeline for Completing the Study

Event	Estimated Timeline
<u>Preliminary work</u>	
1. Focus on topic	October 1987-January 18, 1988
4. Review literature	January 1-April 11, 1988
5. Establish timeline	January 25-February 8, 1988
7. Establish budget	January 25-February 8, 1988
2. Develop chapter 1 proposal	February 15-30, 1988
3. Develop chapter 2 proposal	February 15-30, 1988
4. Identify sample populations, revise as necessary	February-April; Fall 1988
5. Meet with advisors to present proposal drafts	February 29-March 28, 1988
6. Develop procedures for data collection	March 3-May 2, 1988
7. Revise timeline	March 3, 1988; February 16, 1988
8. Revise budget as necessary	March 3-14, 1988; May 2, 1988; February 16, 1989
9. Revise chapters 1, 2 outline	March 14-April 18, 1988
10. Develop chapter 3	March 14-April 25, 1988
11. Design mock-up tables	April 4-July 11, 1988
12. Committee review meeting	April 11-May 9, 1988
13. Complete chapter 1	April 18-25, 1988
14. Select jury of experts	April 25-June 20, 1988
15. Complete brief chapter 2	May 2, 1988
16. Design survey instruments	May 2-June 20, 1989
17. Proposal meeting	May 11, 1988
18. Publish press releases for the study	May, September-November, 1988
19. Complete proposal revisions	June 24, 1988
<u>Jury critique and validation</u>	
20. Validation of instruments	July 5-August 15, 1988
21. Revise instruments as needed	August, 1988
<u>Pilot-testing</u>	
22. Typeset and print surveys	August-September, 1988
23. Type cover letters	August-September, 1988
24. Assemble materials for mailing	August-September, 1988
25. Mail pre-notification postcard	September 15, 1988
26. Mail surveys	September 23, 1988
27. Thank you/follow-up postcard	September 30, 1988
28. Send second follow-up mailing	October 14, 1988

Table E-1 (continued)

Event	Estimated Timeline
29. Send third follow-up mailing	November 11, 1988
30. Cut-off date for last survey	November 26, 1988
<u>Main study</u>	
31. Revise surveys as needed	Mid September-October, 1988
32. Typeset and print surveys	October, 1988
33. Computer program prepared for processing of data	October, 1988
34. Mail pre-notification postcard	October 25, 1988
35. Mail surveys	November 1, 1988
36. Thank you/follow-up postcard	November 8, 1988
37. Send second follow-up mailing	November 18, 1988
Telephone calls to educators	November-December, 1988
38. Data processing of surveys including non-respondents	November-January, 1989
39. Cut-off date for last survey	December 31, 1988
<u>Finalizing the study</u>	
40. Complete chapter 2	December, 1988
41. Submit chapters 1, 2, and 3 revise as necessary	February, 1989
42. Analyze data	February, 1989
43. Submit chapters 4 and 5 revise as necessary	March, 1989
44. Dissertation committee meeting	March 17 or 27, 1989
45. Make suggested revisions	April, 1989
46. Oral defense	April 10-13, 1989
47. Dissertation to committee	April 14, 1989
48. Dissertation to graduate college	April 28, 1989
49. Graduate	May 13, 1989

APPENDIX F

ESTIMATED DISSERTATION BUDGET

Table F-1

Estimated Dissertation Budget

Description	Expenditures
1. Photocopies and materials	562.00
2. Postage*	595.00
3. Contracted services, including a computer search, mailing list rental, typesetting and printing donated*	74.00
4. Stationery and supplies, including: Envelopes	63.00
Computer supplies, including postcards, labels, ribbons, disks, carton of paper	52.00
Paper, including letterhead stationery and miscellaneous items. Surveys and endorsement paper donated*	40.00
5. Gift incentives, including gift certificates, packets of coffee, crisp dollar bills	475.00
6. Dissertaion finalization, including paper, printing, binding, microfilming, copyright fees, and post-comprehensive fees	418.00
7. Telephone	100.00
8. Travel	60.00
9. Memberships and subscriptions	105.00
10. Miscellaneous, including general correspondence	20.00
	\$ 2564.00
11. *Donations were provided for postage (\$250), typesetting (\$638), pre-press services (\$517), and printing (\$282)	
EST. COST TOTAL	\$ 877.00



APPENDIX G

POPULATION DISTRIBUTION OF SMALL, MEDIUM, AND LARGE  
IOWA GRAPHIC ARTS MANUFACTURERS BY INDUSTRY  
SUB-GROUPS AND EMPLOYEE SIZE: 1987-1988

Table G-1

Population Distribution of Small, Medium, and Large  
Iowa Graphic Arts Manufacturers by Industry  
Sub-Groups and Employee Size: 1987-1988

SIC	Major Group	E M P L O Y E E S I Z E			
		TOTAL	SMALL 01-20 A	MEDIUM 21-50 B	LARGE 51+ C
271	Newspapers and commercial	217	159	40	18
272	Periodicals	27	21	3	3
273	Books	47	42	2	3
274	Miscellaneous publishing	50	41	6	3
275	Commercial printing	248	171	44	33
276	Business forms	24	14	3	7
277	Greeting card publishing	4	2	-	2
278	Blankbooks, looseleaf binders, bookbinding and related work	44	35	3	6
279	Service industries for the printing trade	54	50	2	2
TOTAL		715	535	103	77

Note. From Directory of Iowa Manufacturers: 1987-88, by the Iowa Department of Economic Development, 1987, pp. 270-303. Des Moines, IA: Iowa Department of Economic Development; List of companies: Members (Computer generated mailing list), by J. R. Frey, 1987, Des Moines, IA: Printing Industries of the Midlands.

APPENDIX H

PRESCREENING POSTCARDS SENT TO HIGH SCHOOL  
AND POST-HIGH SCHOOL EDUCATORS

PRE-SCREENING POSTCARD FOR HIGH SCHOOL EDUCATORS

Dear Graphic Arts/Communications Teacher:

March 25, 1988

The Industrial Technology Dept. at the Univ. of Northern Iowa, with the support of the International Graphic Arts Education Association (IGAEA), is attempting to identify and compile a list of names of Secondary School Iowa Graphic Arts or Graphic Communications Teachers who are responsible for teaching one or more courses in Graphic Arts. I would appreciate it if you would complete the information on the attached card and return it to me. Thank you very much!

John Gindete  
 Graphic Arts Teacher  
 1939 College St. # 235  
 Cedar Falls, IA 50613

PLEASE COMPLETE THE ATTACHED CARD, SEPARATE, AND RETURN IT  
 POST-MARKED ON OR BEFORE APRIL 15, 1988

TO: John Gindete  
 Graphic Arts Teacher  
 1939 College St. # 235  
 Cedar Falls, Iowa  
 50613

Please PRINT teachers' names who are responsible for teaching one or more GRAPHIC ARTS/PHTG classes. List yourself, if applicable. Indicate Course

Mr./Ms./Mrs. PRINT: Name Course Title(s) Grade Level(s)

PLEASE CIRCLE: Our School is Best Described as a: Middle School  
 JHS  
 H/d/SIS  
 Jr./SIS  
 HS (General)  
 HS (Vocational)  
 Other

PLEASE COMPLETE: Last day for TEACHERS is June: \_\_\_\_\_  
 First day for STUDENTS is Aug-Sept: \_\_\_\_\_  
 Please PRINT Name(s)/Addresses of 1 or 2 Exemplary IOWA Graphic Arts Instructors (JHS-Univ. Levels) who are well respected.

PRE-SCREENING POSTCARD FOR POST-HIGH SCHOOL EDUCATORS

(1) We have faculty/staff (full or part-time) who are responsible for teaching one or more graphic arts courses. Dept. Phone No.: \_\_\_\_\_  
 ICS (Please list--including yourself, if applicable) (Please check & return card)

Dr./Mr./Ms. PRINT: Name \_\_\_\_\_ Title \_\_\_\_\_ Dept. \_\_\_\_\_

CIRCLE BEST CHOICE (2) \_\_\_\_\_

CIRCLE ALL THAT APPLY (4)

The level of our institution is: \_\_\_\_\_ The emphasis of our GA/prtg program is: \_\_\_\_\_ The degrees we offer in GA/prtg are: \_\_\_\_\_

Voc/Tech School \_\_\_\_\_ GA Technology \_\_\_\_\_ Voc. Certificate \_\_\_\_\_  
 2yr Coll. \_\_\_\_\_ GA Education (Tchg) \_\_\_\_\_ Associate Degree \_\_\_\_\_  
 4yr College \_\_\_\_\_ GA Management \_\_\_\_\_ Bachelor's Deg. \_\_\_\_\_  
 University \_\_\_\_\_ NO-PROGRAM EMPHASIS \_\_\_\_\_ Master's Degree \_\_\_\_\_  
 Other: \_\_\_\_\_ Other: \_\_\_\_\_

John Gindele  
 Graphic Arts Instructor  
 and Research Associate  
 1939 College St. # 235  
 Cedar Falls, IA 50613

TO: John Gindele  
 Graphic Arts Instructor  
 and Research Associate  
 1939 College St. # 235  
 Cedar Falls, Iowa  
 50613

Dear Post-Secondary Educator: \_\_\_\_\_ 1988

The Industrial Technology Dept. at the Univ. of Northern Iowa, in partnership with the Printing Industries of the Midlands (PII), and with the support of the International Graphic Arts Education Association, is attempting to identify and compile a list of names of Iowa Graphic Arts/Printing or Graphic Communications Instructors who are responsible for teaching one or more courses in Graphic Arts/Printing. I would appreciate it if you would complete the information on the attached card and return it to me. Thank you very much!

PLEASE COMPLETE THE ATTACHED CARD, SEPARATE, AND RETURN IT POST-MARKED ON OR BEFORE 1988

APPENDIX I

VALIDATION OF INSTRUMENTS:

JURY OF EXPERTS

## JURY OF EXPERTS

Industrial Jurors:

Dr. Ron Davis  
Chief Economist, Dir. of Research  
Printing Industries of America  
1730 North Lynn Street  
Arlington, VA 22091

Ms. Deana Rador  
President  
Inplant Manager's Association  
Central Life Assurance Co.  
611 5th Avenue  
Des Moines, Iowa 50309

Mr. Don Heuss  
President  
Heuss Printing Company  
P. O. Box 487  
Ames, Iowa 50010

Secondary Education Jurors:

Mr. Jim Cox  
Graphic Arts Teacher  
Thomas Jefferson High School  
1243 20th St. S.W.  
Cedar Rapids, Iowa 52404

Mr. Richard L. Cox  
Printing Teacher  
Burlington High School  
421 Terrace Drive  
Burlington, Iowa 52601

Mr. Danny Ford  
Graphic Arts Teacher  
Ottumwa High School  
2nd & College  
Ottumwa, Iowa 52501

Mr. Robert M. George  
Teacher/Department Head  
Industrial Technology Dept.  
Anamosa Senior High School  
209 Sadie Street  
Anamosa, Iowa 52205

Mr. Dale Harsh  
Graphic Arts Teacher  
Des Moines Technical High School  
1800 Grand Avenue  
Des Moines, Iowa 50307

Mr. David A. White  
Graphic Arts Teacher  
Thomas Jefferson High School  
2501 West Broadway  
Council Bluffs, Iowa 51501

Post-Secondary Education Jurors:

Dr. Larry L. Bradshaw  
Assistant Professor  
Iowa State University  
Industrial Educ. & Tech. Dept.  
114 I. Ed. II  
Ames, Iowa 50011

Mr. Richard Scroggs  
Graphic Arts Instructor  
Des Moines Area Community College  
2006 South Ankeny Blvd.  
Ankeny, Iowa 50021

Mr. James Van Klompenburg  
Graphic Arts Instructor  
Western Iowa Technical Comm. College  
P. O. Box 265, 4647 Stone Avenue  
Sioux City, Iowa 51102

APPENDIX J

OPINIONNAIRE RESPONSE WAVES AND FOLLOW-UP TECHNIQUES  
FOR IOWA GRAPHIC ARTS MANUFACTURERS AND EDUCATORS



Table J-1

Opinionnaire Response Waves and Follow-Up Techniques  
for Iowa Graphic Arts Manufacturers

Dates (1988)	Activities	Opinionnaires Returned		Opinionnaires Outstanding	
		Number	Percent	Number	Percent
Oct. 25	Pre-notification postcards mailed to 250 manufacturers	-	-	-	-
----- WAVE I -----					
Nov. 1	First mailing with cover letter, endorsements, dollar, gift certificate, opinionnaire sent to 250 manufacturers	97	38.8	153	61.2
----- WAVE II -----					
Nov. 8	Thank you/reminder follow-up postcard mailed to 250 manufacturers	136	54.4	114	45.6
----- WAVE III -----					
Nov. 18	Second follow-up letter with hand-written note, packet of Sanka, another gift certificate, and opinionnaire sent to 114 non-respondents	186	74.4	64	25.6
----- WAVE IV -----					
Dec. 11	Third follow-up letter with hand-written note, another packet of Sanka, gift certificate, and opinionnaire sent to 64 non-respondents	202	80.8	48	19.2
Cut-off Dec. 31					
----- WAVE V -----					
	There were 21 unusable opinionnaires with 181 usable.*	181	71.5		

Note. \* = 181/253 (N = 253 as discussed in the text).

Table J -2

Opinionnaire Response Waves and Follow-Up Techniques  
for Iowa Graphic Arts Educators

Dates (1988)	Activities	Opinionnaires Returned		Opinionnaires Outstanding	
		Number	Percent	Number	Percent
Oct. 25	Pre-notification postcards mailed to 46 educators	-	-	-	-
----- WAVE I -----					
Nov. 1	First mailing with cover letter, endorsements, dollar, gift certificate, opinionnaire sent to 46 educators	13	28.3	33	71.7
----- WAVE II -----					
Nov. 8	Thank you/reminder follow-up postcard mailed to 46 educators	32	69.6	14	30.4
----- WAVE III -----					
Nov. 18	Second follow-up letter with hand-written note, packet of Sanka, another gift certificate, and opinionnaire sent to 14 non-respondents	41	89.1	5	10.9
----- WAVE IV -----					
Dec. 11	Third follow-up letter with hand-written note, another packet of Sanka, gift certificate, and opinionnaire sent to 5 non-respondents	41	89.1	5	10.9
Cut-off Dec. 31					
----- WAVE V -----					
	There was 1 unusable opinionnaire with 40 usable.	40	87.0		

APPENDIX K  
AUTHORIZATION TO CONDUCT RESEARCH  
INVOLVING HUMAN SUBJECTS

AUTHORIZATION TO CONDUCT RESEARCH  
INVOLVING HUMAN SUBJECTS

# The Graduate College

UNIVERSITY OF NORTHERN IOWA • CEDAR FALLS, IOWA 50614 • 138 LATHAM HALL • OFFICE OF THE DEAN • 319-273-2748

June 23, 1988

John Gindele  
Department of Industrial Technology  
University of Northern Iowa

Dear Mr. Gindele:

Your project, "Employment Needs of the Graphic Arts Industry in Iowa as Perceived by Iowa Graphic Arts Manufacturers and Iowa Graphic Arts Educators," which you submitted for human subjects review on June 13, 1988, has been determined to be exempt from further review under the guidelines stated in the UNI Subjects Handbook. You may commence participation of human research subjects in your project.

Your project need not be submitted for continuing review unless you alter it in a way that increases the risk to the participants. If you make any such changes in your project, you should notify the Graduate College Office.

If you decide to seek federal funds for this project, it would be wise not to claim exemption from human subjects review on your application. Should the agency to which you submit the application decide that your project is not exempt from review, you might not be able to submit the project for review by the UNI Institutional Review Board within the federal agency's time limit (30 days after application). As a precaution against applicants being caught in such a time bind, the Board will review any projects for which federal funds are sought. If you do seek federal funds for this project, please submit the project for human subjects review no later than the time you submit your funding application.

If you have any further questions about the Human Subjects Review System, please contact me. Best wishes for your project.

Sincerely,



Ruth Ratliff  
Assistant to the Dean  
for Faculty and Grants Services

cc: Dr. John C. Downey  
Dr. E. A. Dennis

APPENDIX L

SPOT ANNOUNCEMENTS PROMOTING AND ENCOURAGING  
PARTICIPATION IN THE STUDY

SPOT ANNOUNCEMENTS SUBMITTED FOR PUBLICATION IN THE MAY, 1988  
NEWSLETTERS OF THE CRAFTSMEN CLUBS OF COUNCIL BLUFFS/OMAHA,  
DES MOINES, IOWA CITY, WATERLOO

MAJOR STUDY OF IOWA'S GRAPHIC ARTS  
INDUSTRY UNDERWAY

A major study of the Employment Needs of the Graphic Arts Industry in Iowa is being developed by Waterloo Craftsmen Club member John Gindele as part of his graduate research at UNI. Graphic arts firms throughout the state of Iowa will be contacted in September for their input regarding the present and future needs of the industry. Firms of all sizes (1 to 1000+ employees) and all SIC classification groups (Publishers/ Printers of Newspapers, Periodicals, Books Miscellaneous Items, Commercial, Business Forms, Greeting Cards, Bankbooks and related work, and Trade Shops such as type-setters, platemakers, color separators, etc.) will be contacted in order to obtain the most representative sample and get a "pulse" of the status of the Iowa Graphic Arts Industry. Confidentiality will be of primary concern. No firm will be identified by name in any report. An accumulation of data from all of the firms will be presented by groups. A second part of this study will involve graphic arts educators. John will be contacting all Iowa secondary and post-secondary graphic arts instructors for their input regarding the industry, and also gather selected demographic information.

A need for this study is based on several factors which involve the graphic arts industry, graphic arts educators and other school personnel, professional and trade associations, and government agencies. These concerned groups have an interest in identifying the future employment needs of the graphic arts industry, because nationally, graphic arts technology is changing rapidly, a projected decline of young workers entering the labor market is forecasted, and a shortage of skilled graphic arts workers is purported to exist. The effects of these factors on the graphic arts industry in Iowa is not known.

The study is designed to be a cooperative venture between industry and education. Since educational institutions are a supplier of skilled labor, and industry is a consumer of skilled labor, John believes the benefit of such a partnership between education and industry is apparent. Educators can benefit from this study through a current awareness of the needs of the graphic arts industry in which technology is

changing so rapidly and affecting the employment demands of skilled and managerial workers. Knowledge of current and accurate data of Iowa's graphic arts industry can place Iowa graphic arts educators and school counselors in the best position to offer proper career guidance to students who may be interested in graphic arts employment. Also, results of this study could be useful for determining curricula content—to identify areas of concentration needed in existing graphic arts programs, and redirect, if necessary, the emphasis of existing programs. It is anticipated that graphic arts educators and curriculum designers will be able to update/adjust curricula to reflect current and future trends in the industry. Governmental agencies and trade associations will hopefully benefit from the results of this study by obtaining a truer picture of the present and future employment needs of Iowa's graphic arts industry.

This study is endorsed by numerous groups. They include the Printing Industries of the Midlands (PIM), International Association of Printing House Craftsmen (IAPHC), Graphic Arts Technical Foundation (GATF), the State of Iowa's Department of General Services (Supt. of Printing) and Department of Education, and the Department of Industrial Technology at the University of Northern Iowa.

If you are contacted this Fall, John asks for your support in completing and returning the opinionnaire, which should take approximately 10 minutes of your time. Only through sharing your knowledge will industry and education benefit. A summary of the results of the study will be made available through various publications. By providing the necessary information, respondents will be able to see how their company's present and future employment needs, and opinions regarding selected issues, compares to the rest of Iowa's graphic arts industry.

P.S. Because of the critical shortage of students entering the graphic arts field, John's brother Joseph, will be undertaking a nationwide graduate research study of the Recruitment Practices Influencing Enrollment of Four-Year Undergraduate Students Who Specialize in Graphic Arts.

John

SPOT ANNOUNCEMENTS SUBMITTED FOR PUBLICATION IN THE SEPTEMBER, 1988  
NEWSLETTERS OF THE CRAFTSMEN CLUBS OF COUNCIL BLUFFS/OMAHA,  
DES MOINES, IOWA CITY, WATERLOO

**EMPLOYMENT NEEDS OF  
IOWA'S GRAPHIC ARTS INDUSTRY:**

A cooperative research venture between graphic arts manufacturers (printers) and graphic arts educators is being conducted in September by Waterloo Club member John Gindele. As part of his dissertation research at UNI, Gindele is studying the employment needs/trends for skilled production workers, management, and sales personnel in companies of all sizes and areas of specialization.

The project is endorsed by numerous professional organizations. These include the Printing Industries of the Midlands (PIM), Graphic Arts Technical Foundation (GATF), Craftsmen's Clubs of Des Moines, Iowa City, Omaha, and Waterloo, International Graphic

Arts Education Association (IGAEA), the Career Information System of Iowa (Department of Education), and the Department of Industrial Technology at UNI.

If you are contacted, John asks for *your assistance in completing and returning the opinionnaire*. Only through sharing your knowledge will industry and education benefit. All information will remain strictly confidential and respondents will be able to see how their company's present and future employment needs and opinions regarding selected issues compares to the rest of Iowa's graphic arts industry.

Submitted by John Gindele

SPOT ANNOUNCEMENTS SUBMITTED FOR PUBLICATION IN THE OCTOBER  
AND NOVEMBER, 1988 NEWSLETTERS OF THE CRAFTSMEN CLUBS OF  
COUNCIL BLUFFS/OMAHA, DES MOINES, IOWA CITY, WATERLOO

**Reminder: Employment Needs of Iowa's Graphic Arts Industry (Study)**

This study, endorsed by various graphic arts organizations, will take place between October and November.

SPOT ANNOUNCEMENTS SUBMITTED FOR PUBLICATION IN THE SEPTEMBER,  
OCTOBER, AND NOVEMBER, 1988 ISSUES OF PrintNews

**Major Study of Iowa's Graphic  
Arts Industry Underway**

A major study of the *Employment Needs of the Graphic Arts Industry in Iowa* will be conducted by PIM member John Gindele as part of his doctoral research at the University of Northern Iowa, Cedar Falls. Graphic arts firms throughout Iowa will be contacted in September for their input regarding the present and future personnel needs of the industry, and confidentiality will be of primary concern. An accumulation of data from all of the firms will be presented by groups.

A second part of this study will involve graphic arts educators. Gindele will be contacting all Iowa secondary and post-secondary graphic arts instructors for their input regarding the industry, and he will also gather selected demographic information.

A need for this study is based on several factors which involve the graphic arts industry; graphic arts educators and other school personnel; professional and trade associations; and government agencies. These concerned groups have an interest in identifying the future employment needs of the graphic arts industry, because nationally, graphic arts technology is changing rapidly; a projected decline of young workers entering the labor market is forecasted; and a shortage of skilled graphic arts workers is believed to exist. The effects of these factors on the graphic arts industry in Iowa are not known.

The study is designed to be a cooperative venture between industry and education. Educators can benefit from this study through a current awareness of the needs of the graphic arts industry. Knowledge of current and accurate data of Iowa's graphic arts industry can also place Iowa graphic arts educators and school counselors in the best position to offer proper career guidance to students who may be interested in graphic arts employment. Governmental agencies and trade associations may also benefit from the study results by obtaining a truer picture of the present and future employment needs of Iowa's graphic arts industry.

This study is endorsed by numerous groups including the Printing Industries of the Midlands (PIM); International Association of Printing House Craftsmen (IAPHC); Graphic Arts Technical Foundation (GATF); the State of Iowa's Department of General Services (Supt. of Printing); the Department of Education; local Craftsmen Clubs of Des Moines, Iowa City, Omaha, and Waterloo; and the Department of Industrial Technology at the University of Northern Iowa.

If you are contacted this fall, please complete and return the opinionnaire. A summary of the results of the study will be made available through various publications.

September, 1988 (p. 38)

**Reminder:**

**Employment Needs of Iowa's  
Graphic Arts Industry (Study)**

This study, endorsed by various graphic arts organizations, will take place between October and November.

We encourage you to complete the short opinionnaire if you receive one.

Your responses are needed to help in identifying and meeting the demand for skilled production, management, and sales personnel in the industry.

October, 1988 (p. 33)

**Reminder:  
Employment Needs of  
Iowa's Graphic Arts  
Industry Study**

This study, endorsed by various graphic arts organizations, will take place throughout November.

We encourage you to complete the short opinionnaire if you receive one.

Your responses are needed to help identify and meet the demand for skilled production, management, and sales personnel in the industry.

Thank you!

November, 1988 (p. 29)



APPENDIX M

LETTERS OF TRANSMITTAL TO  
\$25 CASH-DRAWING WINNERS AND  
INDIVIDUALS REQUESTING  
SURVEY RESULTS

## LETTER TO \$25.00 CASH-DRAWING WINNERS



**University of Northern Iowa**  
**Department of Industrial Technology**

Industrial Technology Center  
 Cedar Falls, Iowa 50614  
 Phone (319) 273-2561

April 17, 1989

Dear:

Enclosed please find a check for twenty-five dollars. Congratulations on winning this money for submitting a coupon with the completed "Employment Needs of Iowa's Graphic Arts Industry" opinionnaire by the established deadline.

Thank you again for taking time out of your busy schedule to participate in this research study which was an important part of my doctoral program. You were one of 181 graphic arts manufacturers and 40 graphic arts educators who returned usable opinionnaires that were part of the main study. You have indeed contributed to the growth of the graphic arts field.

Sincerely,

John F. Gindele,  
 Doctoral Candidate, and  
 Graphic Arts Educator

Winners: Mr. Charles Nixon  
 Owner  
 Coon Rapids Enterprise  
 504 Main Street  
 Coon Rapids, IA 50058

Mr. Robert E. Buckert  
 Industrial Arts Teacher  
 Keokuk Senior High School  
 2285 Middle Road  
 Keokuk, IA 52632

## LETTER TO INDIVIDUALS REQUESTING SURVEY RESULTS



**University of Northern Iowa**  
**Department of Industrial Technology**

Industrial Technology Center  
Cedar Falls, Iowa 50614  
Phone (319) 273-2561

Dear Graphic Arts Professional:

Last fall/winter you participated in a statewide study of the "Employment Needs of Iowa's Graphic Arts Industry," involving graphic arts manufacturers and graphic arts educators. At that time you indicated an interest in receiving a copy of the opinionnaire results. I am happy to enclose this information for you and hope that you will find it informative.

A more comprehensive treatment of this study may be found in my dissertation entitled: Employment Needs of the Graphic Arts Industry in Iowa as Perceived by Iowa Graphic Arts Manufacturers and Iowa Graphic Arts Educators, located in the Walter O. Rod Library at the University of Northern Iowa. This study will also be made available on microform towards the end of this year.

Thank you again for taking time out of your busy schedule to participate in my research survey. You have indeed contributed to the growth of the graphic arts field!

Sincerely,

John F. Gindele  
Doctoral Candidate, and  
Graphic Arts Educator

## APPENDIX N

## ADDITIONAL TABLES

TABLE N-1  
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Table N-1

Comparison of Changes in Skill and Technical Knowledge  
Required for the Job Today as Compared to the Last  
Five Years (Fall 1983) by Employee Areas, as  
Perceived by Graphic Arts Manufacturers and Graphic  
Arts Educators in Iowa

Employment Areas (Issues 1-12)	Changes in Skill/Technical Knowledge in the Last Five Years						N/R
	Decrease		Little Change		Increase		
	f	%	f	%	f	%	
<u>Skilled Production Workers</u>							
1. Design and layout							
Mfgs.	8	4.4	70	38.9	102	56.7	1
Educ.	1	2.5	17	42.5	22	55.0	0
2. Typesetting and copy preparation							
Mfgs.	14	7.8	42	23.5	123	68.7	2
Educ.	1	2.5	11	27.5	28	70.0	0
Pre-press operations							
3. Camera, b & w							
Mfgs.	11	6.1	138	76.7	31	17.2	1
Educ.	2	5.1	30	76.9	7	17.9	1
4. Camera, color separation							
Mfgs.	13	7.3	73	41.2	91	51.4	4
Educ.	2	5.0	10	25.0	28	70.0	0
5. Scanner separation							
Mfgs.	6	3.4	59	33.1	113	63.5	3
Educ.	0	0.0	2	12.5	35	87.5	0
6. Proofing, b & w							
Mfgs.	12	6.8	145	81.9	20	11.3	4
Educ.	2	5.1	31	79.5	6	15.4	1
7. Proofing, color							
Mfgs.	4	2.3	98	55.7	74	42.0	5
Educ.	0	0.0	13	33.3	26	66.7	1

Table N-1 (continued)

Employment Areas	Changes in Skill/Technical Knowledge in the Last Five Years						N/R
	Decrease		Little Change		Increase		
	f	%	f	%	f	%	
8. Stripping/ platemaking							
Mfgs.	7	4.0	111	63.1	58	33.0	5
Educ.	0	0.0	23	57.5	17	42.5	0
9. Pressroom							
Mfgs.	4	2.3	82	46.3	91	51.4	4
Educ.	0	0.0	15	38.5	24	61.5	1
10. Binding/finishing							
Mfgs.	6	3.5	117	68.0	49	28.5	9
Educ.	0	0.0	30	76.9	9	23.1	1
11. <u>Management Personnel</u>							
Mfgs.	3	1.7	76	42.7	99	55.6	3
Educ.	0	0.0	15	37.5	25	62.5	0
12. <u>Sales Personnel</u>							
Mfgs.	1	0.6	68	38.2	109	61.2	3
Educ.	1	2.5	15	37.5	24	60.0	0

Note. f = frequency; % = percent, Mfgs. = manufacturers (N = 181);  
Educ. = educators (N = 40); N/R = no response.

Table N-2

Rank Order by Frequency of Most Important Hiring Characteristics Considered by Iowa Graphic Arts Manufacturers when Seeking New Skilled Production Workers, Management Personnel, and Sales Personnel

Hiring Characteristics	f	Rank
<u>Skilled Production Workers</u>		
Attitude/work habits	110	1
Technical knowledge/skills	95	2
Willingness to improve job skills	69	3
Ambition and initiative	53	4
Previous job experience	44	5
Ability to get along	18	6
Ability to communicate	16	7
Interest in graphic arts	9	8
Personal appearance	7	9
<u>Management Personnel</u>		
Ability to communicate	92	1
Ambition and initiative	70	2
Attitude/work habits	66	3
Technical knowledge/skills	55	4
Previous job experience	40	5
Willingness to improve job skills	32	6
Ability to get along	29	7

Table N-2 (continued)

Hiring Characterisitcs	f	Rank
Interest in graphic arts	16	8
Personal appearance	15	9
<u>Sales Personnel</u>		
Ability to communicate	104	1
Ambition and initiative	80	2
Attitude/work habits	67	3
Personal appearance	50	4
Technical knowledge/skills	33	5
Previous job experience	27	6
Willingness to improve job skills	26	7
Interest in graphic arts	16	8
Ability to get along	12	9

Note. f = frequency; N = 181.



Table N-3

Rank Order of Means of Four Most Important Problems Considered by Iowa Graphic Arts Manufacturers in the Retention of Skilled Production Workers, Management Personnel, and Sales Personnel

Problems in the Retention of Personnel	f	Mean	Rank
<u>Skilled Production Workers</u>			
Poor knowledge/skill ability	170	2.01	1
Unable to get along	169	2.38	2
Unable to adapt to retraining	171	2.70	3
Poor wage scale compatible with other industries/businesses	166	2.85	4
<u>Management Personnel</u>			
Poor knowledge/skill ability	163	2.10	1
Unable to get along	166	2.19	2
Poor wage scale compatible with other industries/businesses	165	2.76	3
Unable to adapt to retraining	162	2.82	4
<u>Sales Personnel</u>			
Poor knowledge/skill ability	163	2.12	1
Unable to get along	160	2.13	2
Poor wage scale compatible with other industries/businesses	161	2.81	3
Unable to adapt to retraining	162	2.83	4

Note. f = frequency; N = 181; rank 1 (lowest mean) to rank 4 (highest mean).

Table N-4

Frequency and Percent of Change in the Use of Printing Processes in the Last Five Years (Fall 1983) by Iowa Graphic Arts Manufacturers

Printing Processes	Decrease		No Change		Increase	
	f	%	f	%	f	%
1. Lithography	8	5.9	56	41.2	72	52.9
2. Letterpress	34	47.9	31	43.7	6	8.5
3. Screen process	1	4.2	15	62.5	8	33.3
4. Flexography	-	-	8	72.7	3	27.3
5. Gravure	-	-	6	75.0	2	25.0
6. Letterset	3	21.4	6	42.9	5	35.7
7. Electrostatic	2	8.0	9	36.0	14	56.0
8. Other*	-	-	6	54.5	5	45.5

Note. f = frequency, % = percent; \* = other processes used; N = 181. Some companies used more than one process.

Table N-5

Frequency and Percent of Iowa Graphic  
Arts Educators by Age Since their Last  
Birthday

Age	f	%
55 +	6	15.0
50 - 54	3	7.5
45 - 49	3	7.5
40 - 44	6	15.0
35 - 39	14	35.0
30 - 34	3	7.5
25 - 29	5	12.5
Total	40	100.0

Note. f = frequency; % = percent; N = 40.

Table N-6

Frequency and Percent of Highest Level of  
Educational Attainment of Iowa Graphic  
Arts Educator Respondents

Highest Level of Educational Attainment	f	%
1. High school diploma	1	2.5
2. Vocational/tech- nical certificate	3	7.5
3. Associate's degree	2	5.0
4. Bachelor's degree	19	47.5
5. Master's degree	10	25.0
6. Doctoral degree	5	12.5
Total	40	100.0

Note. f = frequency; % = percent.

Table N-7

Frequency and Percent of Iowa Graphic  
Arts Educators' Years of Graphic  
Arts Teaching Experience Prior  
to the 1988-89 School Year

Years	Graphic Arts Teaching	
	f	%
30 - 34	1	2.6
25 - 29	1	2.6
20 - 24	3	7.9
15 - 19	3	7.9
10 - 14	9	23.7
5 - 9	8	21.1
1 - 4	13	34.2
No response	2	
Total	40	100.0

Note. f = frequency; % = percent; Mean = 9.1 years; Median = 7.5 years.

Table N-8

Frequency and Percent of Iowa Graphic  
Arts Educators Years of Total Teaching  
Experience Prior to the 1988-89  
School Year

Years	Total Teaching	
	f	%
30 - 34	4	10.3
25 - 29	1	2.6
20 - 24	3	7.7
15 - 19	7	17.9
10 - 14	8	20.5
5 - 9	9	23.1
1 - 4	7	17.9
No response	1	
Total	40	100.0

Note. f = frequency; % = percent; Mean = 13.0 years; Median = 11.0 years.

Table N-9

Frequency and Percent of Iowa  
Graphic Arts Educators Years of  
Industrial Working Experience  
(Full or Part-Time) in the  
Graphic Arts Industry

Years	f	%
21 or more	3	14.3
19 - 20	1	4.8
17 - 18	2	9.5
15 - 16	0	0.0
13 - 14	1	4.8
11 - 12	0	0.0
9 - 10	2	9.5
7 - 8	1	4.8
5 - 6	0	0.0
3 - 4	1	4.8
1 - 2	10	47.6
No response	19	
Total	40	100.0

Note. f = frequency; % = percent;  
Mean = 10.4 years; Median = 4.0 years.

Table N-10

Rank Order by Frequency of Most Important Methods Iowa  
Graphic Arts Educators Used During the Past Two Years  
to Keep Pace with Developments in Graphic Arts

Method	f	Rank
Seminars/workshops/in-service training	24	1-2
Trade journals/magazines	24	1-2
Vendor/technical rep. contact	21	3
Conference/trade exhibits	14	4-5
Field trips	14	4-5
College or vocational coursework	9	6
Work experience in a graphic arts related company	6	7
Associations/organizations	4	8
Other*	1	9

Note. N = 40; \* = other methods such as information from colleagues.



Table N-11

Frequency and Percent of Time that  
Graphic Arts Educators Update their  
Curricula

Curricula Updating	f	%
1. Every year	15	39.5
2. Every two years	4	10.5
3. Every three to five years	15	39.5
4. Longer than five years	4	10.5
5. No response	2	
Total	40	100.0

Note. f = frequency; % = percent; N = 40.

Table N-12

Frequency and Percent of Changes in Student Enrollment in Iowa's Graphic Arts Programs During the Past Three Years According to Graphic Arts Educator Respondents

Enrollment Changes	f	%
1. Increased	10	25.6
2. Decreased	13	33.3
3. No change	16	41.0
4. No response	1	
Total	40	100.0

Note. f = frequency; % = percent; N = 40.

APPENDIX 0

SELECTED COMMENTS FROM IOWA GRAPHIC ARTS  
MANUFACTURERS AND EDUCATORS

## SELECTED COMMENTS FROM IOWA GRAPHIC ARTS MANUFACTURERS

Manufacturers participating in the study had an opportunity to provide comments regarding the study itself or any of the questions contained in the opinionnaire. The following selected comments are grouped into four categories, including comments regarding (a) the importance of the study, (b) other factors relating to the study, (c) the need for skilled workers, and (d) technological change and the need for education and training. To ensure confidentiality, manufacturers are identified by title and county location.

### Comments regarding the Importance of the Study

I receive a request to fill out a survey five to six times each week and am lucky to find time to fill out one. This is one of the lucky ones because it was the most important and most needed I've seen in weeks. Great Project! Have a coke on me. Publisher, Jasper County)

Thanks for the dollar--but you shouldn't have to pay to get the industry to help itself. (President, Johnson County)

Very complete. (Editor & Publisher, Story County)

Your Part III on 'Actual Demand' helps one to think about the future of the company--this is good. (President, Story County)

(1) The continuing technology advances in computer driven machines means that some computer knowledge is a must for any job at any level of education, production through sales. (2) We must develop some sort of vocational or training program for press operators and color stripping for the 17 x 22 size and larger. There are some that now do this for the 10 x 15 but this is not what the commercial printer needs. (3) Some of the current post-high schools are placing the emphasis on the wrong areas. Need less graduates trained as commercial artists and more trained as strippers, press operators, folders/cutters and typesetters. (4) This survey was long overdue. Congratulations to you for doing this one and getting the ball rolling for future surveys. This also helps me to look at my own projected company growth and how related needs will be met. (President, Black Hawk County)

### Comments Regarding Other Factors Relating to the Study

We have a small operation. Questions on this survey are appropriate only for bigger newspapers. (Publisher, Floyd County)

Some of my answers can't apply to small businesses. There should be two separate questionnaires 1 [one] for large shops and one for small - under 5 or 6 employees. Each have definite [sic] needs the other doesn't. For instance in a small shop one person does many jobs and has to be skilled in all aspects where in a large shop each job is specialized. In other words it's harder to work in a small shop you have to have overall training. But in a large shop you have more individual training for a specific job. The hardest problem of a small employer is to find qualified workers that want to work and have simple math abilities of 5th graders. In a small shop there is very little change in employment needs if you have an adequate trained staff. (Owner, Webster County)

You didn't mention high speed copying. This is a growing area in the printing business. (President, Woodbury County)

Bindery & mailing is a large part of our personnel employees. Not too much in your survey relating to these two phases of the printing industry. (President, Polk County)

Non-impact printing is becoming a factor and should be included. (President, Scott County)

### Comments Regarding the Need for Skilled Workers

We are a pressure sensitive label printer, which is a niche market, and growing. Many of your categories are different than our needs. The primary need is for trained press operators for narrow web, label press operations. (Vice President, Polk County)

We at the \_\_\_\_\_ are concerned at the low number of qualified workers in all phases of the printing industry. We have a hard time hiring typesetters and press operators. We finally discontinued our press operation and take our printing to a central plant, due to the difficult time finding and keeping skilled workers. We also need a lot of computer operators who can do typesetting from desktop computers such as Apple and IBM. (President, Madison County)

I see more need for skilled people in the printing trade than ever in my 30 years experience. Electronics are reality but we must still have the basic understanding of old principles and new to be able to use the new electronics to its best capacity. (President, Polk County)

In general, the industry has a large number of good pressmen--not great, but good! The area our industry needs additional education would be in the sales and management departments--someone to determine what is 'cost-effective' production and what is not. Also we could improve in marketing our product. Dear John, your marketing department is doing a good job. You kept 'bugging me' until I rep lied. Thanks for the Sanka! (President, Sioux County)

The employment of personnel in the printing industry is, in my opinion, based on our economy. We do see new shops going into business, but these are low skill led production facilities catching the "dollar shoppers" who are comparing costs on small orders in the most part. The larger order accounts are generally staying with their printers to assure quality & continuity. The main factor--economy--has stopped a great deal of expansion in the printing industry of this state & will probably continue. Good luck on your PhD [sic], John. (Publisher, Dubuque County)

We can't find anyone with any experience. From our own experience we know schooling isn't thought of too highly by prospective employers. My wife and I both have 4 yr. degrees. (Owner, Appanoose County)

Skilled people with the desire to pursue a graphic arts career are becoming increasingly hard to find. It is as if no one knows we exist. (President, Black Hawk County)

If we could get high school kids with a basic knowledge of the screen printing process + a desire to make a career of it, we would pay them well and make a lot for ourselves. Our biggest problem is finding people that are willing to work hard. (Co-owner, Linn County)

I see more and more 4-color, short run printing jobs being done in 5 years. I will need capable people who can do it all. We're a small shop but need intelligent, skilled pressmen. (Publisher, Winnebago County)

This is really an off-the-cuff set of answers. They probably don't even reflect accuracy within our plant, and who has any idea about what will be taking place in 5-years--things are changing so fast. Of some things I'm sure: We train almost everyone ourselves, always have & always will. Our needs are too specific for educational facilities to deal with. We'll be ok as long as there's a source of intelligent, hard-working individuals. However, lately, these types (not even trained) have been hard to come by. Wage scales in this area for press & collator operators are going out of this world, even as profit margins grow slimmer. Most of our competitors do not have our philosophy of training their own people and will do virtually anything to woo our people away. How long they'll stay in business I don't know. (President, Story County)

We are a weekly newspaper--using desktop publishing. We have trained our own people in most cases. Would be interested in seminar where our people could get "hands-on" training with equipment used in weekly shops. We have no need for college graduates. We have a need for people, home grown, with a desire to be some good to the paper, the hometown, school, and the community, more than how much for everything they do. The "how much" will come. Most newspapers are underpaying their employees because other costs are so demanding of any profit mode. (Publisher, editor, printer, and clean-up man, Henry County)

We are a family owned business. Answers on items 28 and 31 are opinions not experience. We have not had many problems with retention or absenteeism. We operate as a "family" with no one ever reprimanded for tardiness. We have flex time, and people can leave for appointments, etc. during the day as long as they make up the work and jobs get out on time. We have had virtually no missed days due to illness in the last 10 years due to this supportive policy. I think ability to communicate and get along should be combined/phrased to include "openness" and flexibility, and somewhere, "honesty" should be included. Please send us copy of results. (President, Polk County)

Since the receipt of your questionnaire on graphic arts, copies of it were prepared and distributed to several key individuals who are involved in recruiting and supervising graphic arts employees. The positions of these individuals are: employee relations associate, production assistant manager, composing room manager, plate/camera assistant manager. It was intended that their responses would be consolidated. As they were reviewed, however, it was noted that responses in several cases were quite diverse. Therefore, all four surveys are being forwarded to you. Notation of who completed each survey is made. As a newspaper and commercial printer, we are cognizant of the limited availability of graphic arts employees in addition to the limited experience and skills that individuals who are available possess. I would welcome the opportunity to discuss graphic arts employees further. Invitation is extended to you to tour the \_\_\_\_\_ production operations. (Employee Relations Manager, Linn County)

### Comments Regarding Technological Change and the Need for Education and Training

As a totally electronic designer, I foresee more and more 'desktop' production. In fact, I intend to move into color video scanning & separations in the near future. I already do all pre-press operations (except for platemaking) electronically. I also produce fine art serigraphs, hence the responses to silkscreen questions. (Owner, Lee County)

As for my opinion on the greatest impact on the design world...the Macintosh computer! (probably no revelation in that thought). Fewer paste-up people will be needed. The DESIGN element is always going to be needed. The tools of the trade will just change. Good luck on your project. (President, Mahaska County)

Workers we hire in the future could put themselves in an advantage by knowing how to run page composition and illustrating programs run by desktop publishing systems. Also, there is a shortage of people (designers) that understand 4-color process and how it relates to printed material final product. (Manager, Dubuque County)

The biggest problem I had is the size of our operation. We have had an increase of part-time recently as a result of going to computer typesetting (1 p.t. typesetter and 4 part-time to help in bindery & mailing & one cleaning person to keep the dust down. So our increase in "automation" has not decreased people, just made it possible to do more & better work. (Publisher, Butler County)

I have found working with people having a basic understanding of the processes with little practical experience to be of most value. People who have worked in other shops seem to be difficult to de-program and re-program into my operation. (President, Story County)

It is very hard to predict the future but I feel the demand for printing will increase faster in the next five years than the economy in general. I feel that very few people know how broad the graphic arts field is. I think it is high time that educators come to us to find out what we can and will be able [to] use in the years to come. A college degree isn't the only answer to a successful [sic] career. (C.E.O., Winnebago County)

Most of our business is structured around phototypesetting. We provide camera-ready art to other printers. We have a small involvement in printing for our own use. Most of the printing that we sell is contracted out to other print shops for production. We use several different printers, depending on quality required and customer's budget. We also make rubber stamps, laminating and engraving. Our main production is type. I enjoyed completing the survey. I feel it's something that needs doing again. I feel that the leaders in graphic arts must be willing to do whatever is necessary to help the younger generation become better qualified to eventually take over today's businesses--seminars, workshops, grants for education, internships, on-the-job training. Many youngsters are interested but simply do not have the money to pay for what's needed. (Owner, Linn County)

We are an inplant shop working for about six companies. May have small differences in some areas because of corporate structure vs. commercial individual-owned shops. Additional training in skilled areas is most necessary. The days of on-the-job training for us are over. (Inplant Manager, Polk County)

Our company is currently working with Area XI community college in providing internships to their students. It's working very well. As far as this study is concerned, it comes off as awfully 'academic'. (President, Polk County)

I appreciate the concern and desire to help meet the needs of the Iowa graphic arts industry. As a graduate of Hawkeye Tech commercial art course, I feel a specific course such as that helped considerably in my ability to handle needs of the industry. Companies working with the schools to provide 'on-the-job' training would be a good teaching tool and benefit both. (President, Black Hawk County)

The business forms segment of the printing industry has generally relied on in-house training for all employees. This is due to the failure of academic institutions to provide training in this area of the graphic arts industry. It would seem to me that if you are educating a student for a particular industry, all segments of it should be covered. To a large degree chances for employment for students are being limited by curriculum. (General Manager, Clinton County)



## SELECTED COMMENTS FROM IOWA GRAPHIC ARTS EDUCATORS

Educators had an opportunity to comment about the study itself or any of the questions contained in the opinionnaire. The following selected comments are grouped into two categories including comments regarding graphic arts programs, and other comments.

### Comments Regarding Graphic Arts Programs

I would just like to comment that due to declining enrollment, it is becoming increasingly difficult to justify additional funds for our graphic arts program. Additional assistance from the state level for vocational education will be needed to continually upgrade our program. Also, help from organizations such as GATF will be needed to keep pace with the growing technical aspect of graphic arts. (Vocational high school teacher, Pottawattamie County)

Increasing math, science, and foreign language requirements are killing the vocational programs in high schools. Most of the talented students can't fit our course into their schedule. (High school teacher, Dubuque County)

The demand and interest of students is present. But, those in positions of authority do not or are neglecting this fact. Otherwise how can they justify cutting a first year program that showed growth in numbers. In 1988-89 2 teachers were cut from the department, therefore graphics was not offered the 1st semester, even though enrollment in graphics was good...full sections plus a waiting list. In short, our program got 'screwed' because of district teacher cuts. (High school teacher, Linn County)

Graphic arts is a very expensive program to operate and new, more updated equipment is too costly for our budget. (High school teacher, Lee County)

Because of the major costs involved in obtaining and maintaining modern equipment many of the questions assume that situations should change to become more current but probable won't. For example, an educator will still have to simulate flexography with a rubber stamp because he can't afford (who would want one!) to have a flexo press in his laboratory. And he probably won't have one in the community. These kinds of drawbacks may make the on-site, industry training the most current--and useful! Good luck with your survey. (University instructor, Black Hawk County)

I manage an inplant training facility in a prison. It is tax supported, consequently, we get by on bare bones. The latest technology, etc. seems to be taboo; I feel like I'm training in passe' techniques. I do believe there is a demand in this area for trained individuals in more technological positions. (Vocational instructor, Polk County)

### Other Comments

Prediction of future trends may be done more effectively with a Delphi study that includes education and industry participants. Care must be taken when interpreting results from educators since there is limited contact with the 'world of practice.' I think your format is well done. (University professor, Story County)

It is kind of hard to complete a survey such as this when you do not consistently deal with the working industry section of graphic communications. The only real feedback I get from industry is on our 2 yearly field trips. Being a high school teacher is not getting any easier. More demands are being put on us all the time, and it is hard to keep up to date in all areas. (High school teacher, Polk County)

Traditional ink and paper printing will have less emphasis. I believe the small print shop and the small in-plant shop will give way to electronic duplicating means. (Community college instructor, Des Moines County)

The trade is not paying enough to entry level workers to entice highly qualified individuals to pursue training. As the trade becomes more technical in nature, workers are required to know more and this should be reflected in their wages at all levels. (Community college instructor, (Pottawattamie County)

VITA

## VITA

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(612) 537-8031

Birthplace: New York City, New York

Date of Birth: May 29, 1944 (twin)

Parents: Otto Gindele, Sr. (from West Germany)  
Mary Čádova Gindele (from Czechoslovakia)

Education: University of Northern Iowa  
Cedar Falls, Iowa  
D.I.T. Industrial Technology, 1989

St. Cloud State University  
St. Cloud, Minnesota  
Ed.S. Information Media, 1988

University of Wisconsin--Stout  
Menomonie, Wisconsin  
M.S. Industrial Education, 1971

St. Cloud State University  
St. Cloud, Minnesota  
B.S. Industrial Arts Education, 1967

St. Cloud State University  
St. Cloud, Minnesota  
A.A. Engineering Technology, 1965

High School of Commerce  
New York City, New York  
Academic Diploma, 1962

Internships: 3M Company, National Market Research in Graphic Arts  
St. Paul, Minnesota, 8 weeks, summer 1986

Industrial Technology  
Industry & Education  
Japan, 4 weeks, summer 1985

Study Tours: Educational institutions, all levels  
Soviet Union, 3 weeks, spring 1983  
England and Wales, 3 weeks, summer 1980

Work Experience: Vice President & Co-founder  
EDU-PAC Publishing Company  
Minneapolis, Minnesota, 1971-present

Graduate Research Assistant  
 Department of Industrial Technology  
 University of Northern Iowa, spring 1988

Industrial Technology Teacher  
 Technology Learning Campus, ISD 281  
 Robbinsdale, Minnesota, 1984-85

Graduate Teaching Assistant  
 Communications Technology  
 Department of Industrial Technology  
 University of Northern Iowa, 1982-83

Industrial Arts Teacher  
 Plymouth Junior High School, ISD 281  
 Plymouth, Minnesota, 1968-82; 1983-84

Industrial Arts Teacher  
 Southwoods Junior High/Senior High School  
 Syosset, New York, 1967-1968

Industrial Arts Teacher  
 Patchogue Senior High School  
 Patchogue, New York, 3/67-6/67

Prof. Licenses  
 Regular:

\*Industrial Education, K-12  
 \*Media Generalist, K-12  
 \*Audiovisual Director, K-12  
 \*Audiovisual Coordinator, K-12  
 \*Librarian, K-12  
 \*Driver Education

Vocational:

\*Trade & Industry Coordinator, Cooperative Training  
 \*Work Experience Coord., Disadvantaged/Handicapped  
 \*Graphic Arts (secondary, post-secondary, adult)

Professional  
 Affiliation:

\*American Federation of Teachers  
 \*Association for Educational Communications &  
 Technology  
 \*American Vocational Association  
 \*Council on Technology Teacher Education  
 \*Epsilon Pi Tau  
 \*Graphic Arts Technical Foundation  
 \*International Graphic Arts Education Association  
 \*International Technology Education Association  
 \*Minnesota Educational Media Organization  
 \*Minnesota Federation of Teachers  
 \*National Association of Industrial Technology  
 \*National Association of Industrial & Technical  
 Teacher Educators  
 \*Phi Delta Kappa  
 \*Technical Association of the Graphic Arts  
 \*Waterloo Club of Printing House Craftsmen  
 \*World Future Society

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3. "Industry Internships: Catalyst for Professional Growth," (co-author) Visual Communications Journal, summer 1987.
4. Market Segment Survey of Trade Shops, Publication and Large Commercial Printers, (co-author of \$ 20,000 research study for the 3M Company, Graphic Preparation Division), August 1986.
5. "General Education, Technology Education, and Industrial Technology in Japan (an Internship Experience)," (co-author) ERIC ED 280 430, September 1985.
6. "Communications Technology and the Industrial Arts/Technology Educator," (co-author) The Technology Teacher, December 1984.
7. Critical book review Megatrends: Ten New Directions Transforming Our Lives, (co-author) Association for Educational Data Systems (AEDS) Journal, Fall 1984.
8. "Interactive Videodisc Technology and its Implications for Education," (co-author) Technological Horizons in Education (T.H.E.) Journal, also on microfiche in ERIC ED 268 963, August 1984.
9. "What Does it Cost to Run a Home?" (co-author) VocEd: Journal of the American Vocational Association, June 1981.
10. Dimensions of Loss and Death Education: A Resource and Curriculum Guide, (published) EDU-PAC Publ. 1979/1986.
11. Dimensions of Loss and Death Education: A Student Activity Workbook, (published) EDU-PAC Publ., 1979/1986.
12. 7 Cafeteria Posters for behavioral lunchroom management. (published) 1978.
13. Computer Project Kit, (co-author) EDU-PAC Publ., 1977
14. Learning Activity Packages: Industrial Processing Series: (1) Separating, (2) Shaping, (3) Joining, (4) Conditioning. 1974.
15. An Instructional Package on How to Make an Instructional Package, (co-author) EDU-PAC Publ., 1971.
16. Learning Activity Packages: (1) Introduction to Computers: General History and Development, (2) Introduction to Time-Sharing and the BASIC Language, (3) Using the Computer to Figure the Cost of Your Industrial Arts Projects, 1971.
17. Student Use of a Computer for Cost Analysis in a 7th Grade Industrial Arts Class with Implications toward American Industry, a thesis for the M.S. degree in Industrial Education, University of Wisconsin--Stout, Menomonie, WI, August 1971.