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Identification of the Skills Needed by Workers in Various Segments of the Graphic Communications Industry

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Introduction

Graphic communications technology is a generic label that utilizes several techniques by which words, graphics, and designs are produced on paper, fabric, and metal or other suitable substrates with the use of inks or pigments. These techniques are also known as "graphic arts," or printing. In the United States, graphic communications has evolved into a major industry and has become more efficient through new technologies. Printing Industries of America (PIA) reports that the graphic communications industry is the third largest industry, employing over 1.2 million people in more than 46,000 establishments and selling over $160 billion of products to print product users (PIA, 2002). The mountain states (New Mexico, Colorado and Wyoming) graphic communications industry employs 21,118 people in more than 1,150 establishments and selling over $2.7 billion dollars (PIA, 2002).

The graphic communications industry consists of four major work divisions: print management, prepress, press, and print finishing. The United States Department of Labor (USDOL) reports that the print management division of the graphic communications industry has occupational positions similar to the positions of many manufacturing industries (USDOL, 2002). Employees in the print management area work closely with and establish ongoing relationships with clients (print buyers) and production workforce in order to deliver the printed products. Employees in the prepress division of the industry prepare materials for the press and printing division according to customer specifications. Additionally, they work with customers to engineer jobs, produce art work, assemble pages, perform output activities such as making plates, and provide support for other technical services (USDOL, 2002).

Employees in the press and printing division of the industry operate and troubleshoot printing presses. They perform make-ready, install and adjust plates, prepare blankets and cylinders, select and mix inks, operate the presses during the print production and monitor print quality and press performance. Additionally, they ensure a safe operating environment and perform preventive maintenance on printing presses (USDOL, 2002). Employees in the print finishing area convert printed sheets into finished products for costumers and consumers. Additionally, they perform miscellaneous binding and finishing operations (USDOL, 2002).

The graphic communications industry offers a host of career opportunities that include management, sales, technical, art, customer service, and more. Graphic communications graduates from technical or community colleges qualify for an entry-level or a technician position in industry. Similarly, graduates of a four-year or university-level graphic communications program qualify for entry-level supervisory management-trainee, or middle-management positions.

Review of Literature

Technological developments in the graphic communications industry are currently changing many of the job descriptions, thereby creating a greater need for qualified and skilled workers. Graphic communications companies and educators need to integrate technological and managerial changes into the training and educational curriculum to prepare the future skilled production workforce and managers for industry. Wilson (2001) stated that the graphic communications industry is in a constant technological flux. He also stated that industry involvement in education is needed to make sound curricular decisions to prepare skilled workers and managers.

Lewis (1996) stated that, like other manufacturing industries, the graphic communications industry also requires skilled educated employees to keep the industry growing profitably. Currently, the United States printing industry is going through a radical reorganization of its workplace due to technological developments in every segment of the industry (Faiola, 1997). Due to these changes, there has been an increased demand for educated and skilled workers with up-to-date technical skills. This demand is due to technological changes in digital prepress, management practices, color management, and digital printing areas of the industry (Lewis, 1996).

According to several published reports, the printing and publishing industry is in desperate need of qualified and skilled workers at every level. For example, jobs in the desktop publishing area alone are expected to grow 74 percent from 1996 to 2006 (Daily, 2000). New work skills will be needed as the graphic communications industry begins to replace older technology with new, digitally-driven technologies that lead to efficiency in print production, profit gain, and to meet the demands of the various market segments.

New technology is often difficult for many older industry workers to learn and is especially compounded by the rapid pace of changes that occurred over the past ten years. Modern graphic communications education can prepare individuals to cope with industry advancements (Faiola, 1999). Graduates with modern graphic communications education and skills are, and will be, in greater demand than ever before in one of the fastest growing industries in the United States.

Purpose of the Research

The purpose of this research was to determine the perceptions of the graphic communications industry on the identification of the skills needed by workers in various segments of the mountain states (New Mexico, Colorado and Wyoming) graphic communications industry. The following questions were investigated.

1. What is current demand for the skills that workers in the print management, prepress, press/printing and bindery areas of the mountain states graphic communications industry need?
2. What will be the future (5 years from now) skills that workers in the print management, prepress, press/printing and bindery areas of the mountain states graphic communications industry need?

Research Method

This research utilized a descriptive research method. The target population consisted of 478 mountain states printing companies. The companies were identified from the Printing and Imaging Association of Mountain States (PIAMS) Print and Graphics Buyers Guide (2000) and PIAMS Membership Directory (2000). In order to elicit information for this study, a three-page survey questionnaire was used to obtain the perceptions of the target population about needed skills. Survey instruments were addressed to the president and/or human resources manager of each company in the study.

During the spring of 2001, 478 survey questionnaires were mailed. Three weeks after the first mailing follow-up surveys were mailed to non-respondents. The following five part Likert-type scale was used throughout the survey questionnaire: 5 = very high demand, 4 = high demand, 3 = moderate demand, 2 = very low demand and 1 = no demand.

Data Analysis and Research Findings

Of the 478 surveys that were mailed, a total of 64 were returned. This represents a 13.40% return rate. Of the 64 surveys returned, 8 were found to be incomplete. Data was generated from the usable returned surveys (11.71%). Descriptive and inferential statistics were the statistical methods used to analyze the data. Analyzed results are presented in the following section.

Demand for the Skilled Workers in Graphic Communications Industry

This section presents the results of the descriptive statistics. A paired two-tailed t-test was conducted to determine if any statistically significant differences exist between the mean scores of industry on current and future demand for skilled workers in the areas of print management, prepress, press and printing, binding and finishing.

1. Print Management Area

The mean scores (maximum 5), standard deviations, and t-values associated with the five skills in the print management area of the graphic communications industry are compiled in Table 1. Significant differences were found in two of five skills. Industry representatives perceived a higher demand for the skills that workers need in the future compared to those of the present for the plant administration and for the production management work areas. Industry representatives feel that these skills are required for operating a successful print business. No significant differences were found in the remaining three of five skills within the print management area. This indicates that industry representatives are in agreement (See Table 1).

2. Prepress Area

The mean scores (maximum 5), standard deviations, and t-values associated with the 21 skills in the prepress area of the graphic communications industry are compiled in Table 2. Significant differences were found in nine of 21 skills. As compared to skills needed in the present, industry representatives perceived that the following skills will be in higher demand in the future: design and layout, typesetting and composition, art and illustration, graphic design, digital camera operations, digital high-end scanner operations, digital and analog proofing, computer to plate (CTP), and digital imposition. No significant differences were found in the remaining 12 of 21 skills within the prepress area. This indicates that industry representatives are in agreement (See Table 2).

3. Press and Printing Area

The mean scores (maximum 5), standard deviations, and t-values associated with the ten skills in the press and printing area of the graphic communications industry are compiled in Table 3. Significant differences were found in three of ten skills. As compared to skills needed in the present, industry representatives perceived that the following skills will be in higher demand in the future: multicolor web offset operations, digital black and white printing, and digital color printing. No significant differences were found in the remaining seven of ten skills within the press and printing area. This indicates that industry representatives are in agreement (See Table 3).

4. Binding and Finishing Area

The mean scores (maximum 5), standard deviations, and t-values associated with the eight skills in the binding and finishing area of the graphic communications industry are compiled in Table 4. Significant differences were found in three of eight skill areas. Industry representatives perceived a higher demand for the skills that workers need in the future compared to those of the present are in automated perfect binding operations, inkjet operations and miscellaneous

Table 1, Comparison of Mean Scores of Current and Future Workforce Skills in the Print Management Area

	Current Need N = 56		Future Need N = 56		
Skills	M	SD	M	SD	t-value
Plant administration	2.46	1.33	2.80	1.29	2.886**
Production management	2.79	1.34	3.04	1.33	2.128*
Sales, estimating and costing	3.21	1.40	3.43	1.23	1.764
Safety and training	2.20	1.13	2.36	1.31	1.921
Customer service	3.29	1.45	3.54	1.33	1.676

*p≤.05, **p≤.01

Table 2. Comparison of Mean Scores of Current and Future Workforce Skills in the Prepress Area

	Current Need N = 56		Future Need N = 56		
Skills	M	SD	M	SD	t-value
Design and layout	2.71	1.47	3.11	1.34	3.311**
Typesetting and composition	2.73	1.50	2.84	1.40	0.947
Page assembly and page make-up	2.50	1.44	2.71	1.38	2.358*
Proof reading and editing	2.39	1.30	2.57	1.25	1.935
Desktop publishing	2.95	1.47	3.02	1.42	0.781
Art and illustration	2.34	1.32	2.54	1.33	2.388*
Typographic design	2.04	1.26	2.11	1.20	0.753
Graphic design	2.66	1.39	2.88	1.36	2.121*
Process camera operations	1.66	1.01	1.64	1.05	0.190
Digital camera operations	1.77	1.14	2.23	1.43	3.802**
Desktop flatbed scanner operations	2.66	1.39	2.84	1.41	1.603
Desktop midrange scanner operations	2.14	1.17	2.34	1.25	1.846
Digital high-end scanner operations	1.73	1.12	2.13	1.27	3.168*
Color separation	2.16	1.32	2.34	1.39	1.935
Color correction and manipulation	2.64	1.42	2.77	1.46	1.357
Digital and analog proofing	2.14	1.18	2.39	1.29	2.363*
Film assembly and stripping	2.25	1.24	2.11	1.20	1.158
Analog plate-making	2.20	1.15	1.95	1.07	1.629
Direct film output and image-setting	2.55	1.40	2.66	1.38	0.667
Computer to plate (CTP)	2.52	1.69	3.25	1.52	4.169**
Digital imposition	2.61	1.64	3.02	1.61	3.305*

*p≤.05, **p≤.01

finishing operations (embossing, die cutting, gluing, etc.). No significant differences were found in the remaining five of eight skills within the binding and finishing area. This indicates that industry representatives are in agreement (See Table 4).

Conclusions and Recommendations

The conclusions of this study are based upon an analysis of the data and major findings. This study compared and identified significant differences that exist among industry representatives on the identification of the skills needed at present and in the future by workers in various segments of the mountain states graphic communications industry. There were significant differences among industry representatives in 17 of the 44 skills. Technological developments in the areas of electronics, computer hardware and software applications, lasers, and computer integrated manufacturing techniques, science and engineering are radically changing the structure of the traditional printing industry. Due to these technological developments, significant changes are continuing in the printing industry, and thus demand a skilled workforce with up-to-date technical skills.

Educational institutions are the major sources of skilled workforce supply. This study can be utilized as a "needs assessment tool" to make decisions on training and educational curriculum revisions. Graphic communications educators need to focus on educating and training students to gain skills that will be in higher demand in the future as compared to those of the present. If needed, educators may implement or introduce new courses and topics in the graphic communications curriculum. For example, industry representatives perceived a higher skills demand in the future for digital color printing. As such, educators can integrate similar contents into the curriculum to meet the future skill demand of the industry. Similarly, industry can train its existing workforce by focusing on those skills that will be in greater need in the future as compared to those of the present.

Table 3. Comparison of Mean Scores of Current and Future Workforce Skills in the Press and Printing Area

	Current Need N = 56		Future Need N = 56		
Skills	M	SD	M	SD	t-value
Sheetfed single color offset	2.43	1.39	2.34	1.44	0.868
Sheetfed multicolor offset	3.18	1.48	3.21	1.52	0.340
Single color web offset	1.18	0.54	1.23	0.060	1.351
Multicolor web offset	1.32	0.86	1.48	1.03	2.261*
Letterpress printing	1.64	0.96	1.64	1.03	0.000
Gravure printing	1.05	0.30	1.02	0.13	0.814
Flexographic printing	1.20	0.62	1.16	0.56	0.629
Screen printing	1.16	0.56	1.20	0.62	1.427
Digital black and white printing	1.95	1.31	2.14	1.39	2.104*
Digital color printing	2.32	1.45	2.86	1.52	4.386**

*p≤.05, **p≤.01

Table 4. Comparison of Mean Scores of Current and Future Workforce Skills in the Binding and Finishing Area

	Current Need N = 56		Future Need N = 56		
Skills	M	SD	M	SD	t-value
Materials handlers	2.38	1.12	2.50	1.14	1.263
Paper cutting	2.98	1.33	2.88	1.25	0.882
Paper folding	2.91	1.39	2.80	1.33	0.724
Automated saddle stitch binding	2.43	1.41	2.59	1.41	1.155
Automated perfect/adhesive binding	1.86	1.24	2.25	1.37	3.567**
Collating and gathering operations	2.45	1.22	2.39	1.20	0.518
Inkjet operations	1.79	1.28	2.05	1.27	2.861**
Miscellaneous finishing operations (embossing, die cutting, gluing, punching, numbering, and laminating etc.)	1.59	0.99	1.80	1.13	2.698*

*p≤.05, **p≤.01

Furthermore, findings can be applied to graphic communications industry in other regions of the country because the trends and changes affecting industry in the mountain states are similar to those occurring nationwide. For example, software vendors change features and functions of image editing software every year, and hence these changes were applied throughout the graphic communications industry and demands skilled workforce to use such software.

Research studies on identification of skills needed by workers are required to make sound curricular decisions for technology-based graphic communications training and educational programs. New developments in industry should be integrated into the curriculum so that both graduates and industry can benefit. Finally, industries and educators must work cooperatively to better promote education, as well as make efforts to enhance the current training curricula and educational programs. Without the cooperative effort of these groups, industry may face a serious skilled workforce shortage in the future.

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