2014

Graphic communications industry trends and their impact on the required competencies of personnel

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GRAPHIC COMMUNICATIONS INDUSTRY TRENDS AND THEIR IMPACT ON THE REQUIRED COMPETENCIES OF PERSONNEL

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

Approved:

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May 2014

ABSTRACT

The graphic communications industry is far-reaching and touches most people's lives on a day-to-day basis. The products affected are as diverse as computers and medical supplies, business cards and billboards, packaging and photos, and a car's dashboard to the image on a t-shirt. As the current employees are retiring in record numbers, and the technology and business processes in the field are changing at a rapid rate, the need for well-prepared employees is greater than ever. In order to best prepare current students for positions in the field, educators need specific information to guide their curriculum development. This has been difficult to obtain due to the extensive variety of organizations under the umbrella of graphic communications.

The purpose of this study was to discover the business and technology trends that will impact the needed competencies for employees in the graphic communications industry of the future. An online survey and telephone interviews were conducted to question current business owners, managers, and human resources personnel to determine the most pressing skills and knowledge sets that future employees will need.

Due to the fact that the survey yielded a very low return rate, it was difficult to prove statistical significance for all of the data results. However, descriptive and inferential statistics were performed, and many of the results are consistent with the literature. The analysis of the survey and phone interview data can help guide educators in programs for graphic communications, as well as companies which provide in-house training programs. The results indicate a

strong need for soft skills, or non-technical skills, in addition to the foundational understanding of the technology and processes. In addition, specific trends were identified in services and products that companies will be offering, such as variable data marketing and electronic storefronts.

This project can serve as a good starting point for additional studies on graphic communications competency needs. Recommendations and strategies are provided for future success.

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Dr. Douglas Hotek, Committee Member

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DEDICATION

It would be impossible to thank my husband, John Smith, for all the help and support that he has given me over the past 6 years as I have worked on my doctorate. Not only was he supportive, but self-sufficient and capable while taking over much of the household work and child wrangling. All this in addition to working full time, or as I often said, "he only works 40 hours a week." Our daughter, Maddie, also had a major part in this accomplishment. She was only 11 when I started, and yet she has been extremely mature and understanding of all the time that I have spent doing schoolwork. Her little notes meant the world to me and I am so fortunate that she is the incredible, caring person that she is. I only hope that I have been a good role model as she is now graduating high school and getting ready to embark on her own continuing academic journey.

I also want to dedicate this work to my extended family and friends. My parents have always been supportive of all of their children getting a good education. Although they never specifically said that I should go until grade 25! Nevertheless, their love, encouragement, and support have been amazing all my life.

My siblings are inspiring to me in all the work that they have done for their own families and those of others. As parents, teachers, and community leaders, they model lives of caring and lifelong learning.

My friends provided chocolate, cartoons, kind words, a kick in the seat of the pants, or whatever seemed to be needed at the time. Mostly they listened to a

lot of whining. I don't think they will ever know how extremely helpful they all were to me in this long, long process. Please accept my gratitude.

ACKNOWLEDGMENTS

It is with sincere and heartfelt thanks that I acknowledge my doctoral committee. While the traditional idea of a doctoral committee is that they are a stern group of individuals trying to prevent the fearful candidate from reaching their goal, nothing could be farther from the truth. My committee was extremely supportive, looking out for my academic well being at every turn. They did their best by trying to guide and warn me of the process ahead. Ultimately, I had to make the journey in my own way and stumble here and there for the sake of learning, but it was then that I began to understand the things they had been trying to tell me all along.

I especially want to acknowledge Dr. Mohammed Fahmy not only as my chair, but as my mentor and so much more. He can be credited (blamed?) for suggesting that I pursue my doctoral degree in the first place. Without his on-going encouragement and guidance, I really don't know if I would have made it to the finish line. Much to his chagrin, my timeline was slower than originally planned, but in the end he never gave up on me. For that I owe him big time.

Thanks to my co-chair, Dr. Julie Zhang, for being a role model and a scholar. Her encouragement and academic assistance were invaluable. Thanks to Dr. Andrew Gilpin for his extreme patience and statistical help. That area is definitely not my forte, and he was inventive in helping me work with what little data I had. I will never forget his advice to "make meaning out of chaos." Thanks to Dr. Doug Hotek for his guidance and support. Doug provided his experience and helpful advice for changes and additions to my dissertation. And last but not

least, thanks to Mr. Chris Neuhaus for his enthusiasm and research help. Chris gave a careful read to each draft of my dissertation and I appreciate his thoughtful feedback. His ongoing interest in research is inspiring.

There are many other people who have supported me and contributed to this accomplishment, especially the current and former office staff in the Department of Technology. They have provided tangible assistance in the form of help with paperwork, registering for classes, etc. In addition, they have provided emotional support and on some days kept me going. As in most large organizations, they are truly the unsung heroes.

Finally, I want to acknowledge my former, current, and future students. They are the reason that I feel joy regarding the work that I do. The implications of this study will be to develop curriculum that will assist in their development as students, future employees, and business owners. It is through their accomplishments that I feel I have succeeded in my job as an educator. I look forward to when I can "pay it forward" and help a future student as they begin their journey with their graduate work.

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INTRODUCTION

Statement of the Problem

The problem that this research will seek to solve is addressing the lack of qualified candidates for jobs in the graphic communications field in the next five to ten years. As in most other fields, current employees are retiring, creating a concern over a shortage of workers in the young-to-middle age range in the next two decades (Tanner, 2002). Also, technology and business processes are changing (Cross, 2008; Davis, 2009a; Davis, 2009b; Dewitz, 2008; Esler, 2008; Farnand, 2008; Fogel & Grossman, 2009; Gilboa, 2002; Henry, 2007; Hurlburt, 2000; Levenson, 2008; Martin, 2008; Pellow & Sorce, 2003; Prust, 2003; Romano, 2004; Webb, 2006). This will leave the field without employees who are best prepared to gain employment in and have successful careers in the field of graphic communications.

Statement of Purpose

The purpose of this mixed methods study will be to identify the current and forecasted trends in the graphic communications field and how they impact required competencies for personnel by surveying and interviewing graphic communications professionals. That information will be provided to educators in higher education for updating and revising postsecondary graphic communications and graphic technologies curriculum to best prepare graduates for attaining placement and success in the industry. The results of this study

could also be used by companies to identify or develop training programs for current employees to efficiently update their skills and knowledge.

Statement of Need

The need and justification for this study are based on the extent of the impact of the graphic communications industry (Luttropp & Greenwald, 2009; Muldoon, 2009) and the sweeping changes that have and will continue to take place in the industry (Prust, 2003).

The graphic communications industry is far-reaching and important to the U.S. economy. When considering just the printing and publishing portions of the industry, estimates are that the revenue is between $100 billion ("Industry Profile: Commercial Printing," 2009) and $150 billion annually (Luttropp & Greenwald, 2009). Also, there are from 35,000 ("Industry Profile: Commercial Printing," 2009) to over 40,000 individual companies employing around 750,000 people (Luttropp & Greenwald, 2009). Other figures from the Graphic Arts Education and Research Foundation (GAERF) show more than 80,000 companies employing 1.3 million people in the printing industry, and generating over $200 billion each year (Muldoon, 2009).

The sweeping changes experienced in the graphic communications field have been discussed and analyzed by many experts in the field. Frank Romano, a long-standing expert in graphic communications, investigated some of these changes with a colloquium of like-minded experts. As reported in *An Investigation into Printing Industry Trends*, Romano lists the following major changes: desktop publishing, personalization, digital links to customers, color,

digital printing, e-commerce, elimination of film and printing plates, workflow, technology integration, variable data printing, distributed production, industry infrastructure, changing structure of demand, migration of print to non-print alternatives, and the vagaries of the economy (Romano, 2004). Each of these has a direct impact on the skills and abilities needed by graduates entering this field.

While similar studies have been conducted in the past (Diez, 1990), newer data are required, the content needs to be more focused on graphic communications/technologies, and business entities need to be surveyed rather than academics. Diez recommends "A needs assessment survey of industry to determine what skills, knowledge, and undergraduate curricula preparations are required for entry level employment…"(Diez, 1990).

Finally, a statement by Faiola (1999) sums up the need "Without addressing future industrial needs today, students will not be adequately prepared to adapt to a future GC [Graphic Communications] workplace" (Faiola, 1999).

Research Questions

The overall guiding question that this research will seek to answer is "What impact will technical and business process trends in the graphic communications industry have on the required competencies of its future personnel?" This will focus specifically on the area of the industry classified as commercial printing. In order to collect data to analyze for this question, the following organizing questions will be used:

1. What is your organization's forecasted level of involvement and implementation with computerization and automation of processes in the next 10 years?
2. What is your organization's forecasted level of involvement and implementation with offering ancillary products and services in the next 10 years?
3. What is the effect, if any, of a changing relationship between your organization and your customers in terms of achieving more of a partner or consultant status?
4. What are the major technical skills that you predict will be needed by your personnel in the next 10 years?
5. What are the major soft or non-technical skills that you predict will be needed by your personnel in the next 10 years?

More specific questions regarding demographics, employee skills, technical innovations, customer relations, etc., will be identified in the Methodologies section of this paper. These will be used in the data collection instruments and processes which will also be discussed in the Methodologies section.

Assumptions

This study supports the assumption that the trends identified in the literature by industry experts are real and will have an impact on graphic communications organizations. In addition, the business owners, managers, and

human resources personnel who will participate in the study are qualified to provide accurate and truthful answers.

Another assumption is that post-secondary programs for graphic communications are teaching some, but not necessarily all, of the knowledge and skills that industry people need. This is supported by the accrediting agencies such as the Association of Technology, Management, and Applied Engineering (ATMAE) and the Accrediting Council of Collegiate Graphic Communications (ACCGC). In addition, many programs work with industrial advisory boards that identify needs and lead the educational programs in their curriculum topic choices.

Finally, the sample population that will be included in this study is representative of the larger population of graphic industry professionals in the United States to whom the results will, on a limited basis, be extrapolated.

Limitations and Delimitations

This study was conducted in view of the following delimitation: the type of organizations contacted to participate will be limited to those defined as primarily printing companies, including commercial printers, quick printers, digital printers, and other groups included in the NAICS (North American Industry Classification Sytem) code 32311 "Printing." Companies who support printing companies but do not offer print services, such as those performing binding, packaging, supplying paper, etc., will not be included.

A limitation of this study concerns the lack of being able to generalize the results to the larger population that the results were intended to include. This

limitation is based on the fact that the response rate of the survey was so low. Forty-two of the 301 people contacted completed the survey, which represents only 17% of the sample group. Taken as a whole, caution should be exercised when generalizing the results to the larger population. Taken individually, there are some items that were shown to be statistically significant. All of these results will be discussed in Chapters 4 and 5.

Another limitation of this study regards the process of conducting the pilot study. Due to the fact that the survey instrument was created by the researcher for this study, and not previously tested, the validity and reliability need to be determined. The reliability was tested by having someone from the target group go through the process of completing the survey and also providing feedback. The validity, however, was not tested or determined since there was a very low response rate for the pilot study. This indicates that caution should be used when generalizing the results to the larger population.

Threats

For the quantitative phase, there are four main threats to internal validity in survey research: mortality, location, instrumentation, and instrument decay. Mortality is not an issue since the survey will be administered only once to each participant, so there is no fear of losing participants. Instrument decay is also not an issue due to the fact that the survey will be conducted using self-response rather than interviewers who may vary from one time to the next. The telephone interviews will be conducted by the same interviewer, the researcher, using a script administered to all participants. Therefore threats have been minimized or

alleviated. The location threat is not a factor due to the survey being administered over the Internet and phone and not in person. Therefore, the major threat to internal validity is defects in the survey instrument. These were addressed through the process of a pilot test and revisions before the questionnaire was delivered to the whole sample of subjects. The budget is low, less than $1000 for the online survey instrument monthly fee, purchase of a call recording program, and the printing and mailing for the survey invitations.

Timeline

The survey instrument was created, reviewed and revised during summer 2013. The survey distribution and interview processes took place during the fall of 2013. Data organization and analysis took place early in the spring semester 2014. The results of the data were written in spring 2014, as well as the analysis and conclusion sections. The dissertation was completed and submitted to the committee in early spring semester 2014.

Definitions of Terms

The following terms are defined to clarify their use in the context of the study:

Commercial Printing

This U.S. industry comprises establishments primarily engaged in commercial printing (except screen printing, books printing) without publishing (except grey goods printing). Printing processes used in this industry include lithographic, gravure, flexographic, letterpress, engraving, and various digital printing technologies. This industry includes establishments engaged in

commercial printing on purchased stock materials, such as stationery, invitations, labels, and similar items, on a job order basis. Establishments primarily engaged in traditional printing activities combined with document photocopying services (i.e., quick printers) or primarily engaged in printing graphical materials using digital printing equipment are included in this industry (NAICS Code Description, 2012).

Digital Printing

Any reproductive technology that receives electronic files and uses spot (or dots) for replication. Ink, toner, ink-jet, or any other dye- or pigment-based transfer system may be used (Prust, 2003, p. 566).

Distributed Printing

Also known as *distributed digital printing* and *distributed production*. With this method, the electronic files are sent digitally to a service bureau near where the printed matter will be distributed. This saves time and shipping cost versus the traditional method, which is to print and distribute the finished product (Prust, 2003).

E-commerce

Also known as e-business. "Browsing, interacting, or doing business electronically with a company or institution over the Internet" (Ryan & Conover, 2004, p. 646).

Graphic Communications

Allied industries, including printing, publishing, advertising, and design, that participate in the production and dissemination of text and images by printed or electronic means (Wilson, Gentile, & Staff, 2009, p. 161).

Imposition

Arrangements of pages on flats so they will appear in proper sequence after press sheets are folded and bound (Dolin, 2006, p. 122). Arranging digital pages in a computer file, using specialized imposition software, to arrange them in the proper sequence (Kipphan, 2001).

Job Definition Format (JDF)

A relatively young industry standard that specifies "a solution for integrating all systems in the print production workflow, from prepress, through press, to postpress, including the management information systems (MIS) monitoring and controlling the workflow." Research is needed for measuring the benefits of using JDF in production (Buckwalter, 2005, pp. 1-2).

Job Ticket

An item used to convey details about the requirements and specifications for a job as it progresses through the stages of administration, production, and postproduction in a printing company. A job ticket can be digital, printed, or a combination of the two (Prust, 2003; Withers, 2000).

Make Ready

Also called set up. All work done on a printing press before running a job (Dolin, 2006; Wilson et al., 2009). Make-ready includes adjusting the plates,

feeder, grippers, side guides; putting inks in the fountains; registering the plates; and, matching the printed result to the supplied proof (bringing it up to color). For short runs of a few thousand, the make-ready costs are a significant percentage of the total printing costs (Dolin, 2006, p. 187).

Platemaking

Preparing a printing plate or other image carrier so that it is ready for the press (Wilson et al., 2009, p. 125).

Platesetter

A device that images printing plates directly from digital image data; no film or any analog processes are required (Wilson et al., 2009, p. 125).

Preflighting

An orderly procedure of checking a list of items to verify that all the components of an electronic file are present and correct prior to submitting the document for high-resolution output (Wilson et al., 2009, p. 125).

Premedia or Prepress

All printing operations prior to presswork, including design and layout, typesetting, graphic arts photography, image assembly, and platemaking (Wilson et al., 2009, p. 125).

Print on Demand

"…short-run, distributed, just-in-time printing" that is often, but not always, produced using a digital printing method (Prust, 2003, p. 201).

Printing

A process involving the use of a specialized machine (a *printing press*) to transfer an image from an image carrier to a substrate, usually paper. Most often, printing involves making duplicates (the printed product) in large quantities (Prust, 2003, p. 581).

Proof

Test sheet made to reveal errors or flaws, predict results and record how a printing job is intended to appear (Dolin, 2006, p. 190).

Repurposing

The process of reformatting information to fit various output media, including printed and digital (Withers, 2000).

RIPping

The process of converting a vector-based page description language, such as Postscript, to a raster format at the resolution and in the format required for a specific output device or image setter/platesetter. RIPping may also incorporate machine-specific instructions, and the RIPping may occur either in the imaging device or in a separate computer system. Some RIPs support color separations and trapping, and can output to proofing prior to imaging (Dolin, 2006, p. 190).

Substrate

Any base material with a surface that can be printed or coated (Wilson et al., 2009, p.128).

Trapping

(1) Image trapping is a technique in which abutting colors are slightly overlapped to minimize the effects of misregistration on the printing plates. (2) Ink trapping refers to the way various colors of ink on a press adhere to one another when wet compared to the way one layer of ink adheres to the paper (Dolin, 2006, p. 194).

Turnaround Time

The time that it takes to complete a print job starting when it enters the printing organization, and ending when the job is given to the customer in the finished state.

Web-to-Print (Web2Print)

An online system that allows customers to perform transactions over the Internet. Transactions include creating and customizing templates, reviewing and soft proofing files, ordering prints, paying for prints, confirming orders, and monitoring delivery all via the Internet. The system interacts with customers, suppliers, and employees (Cummings & LeMaire, 2005, as cited in Dewitz, 2008, p. 8).

Variable Data

Also known as one-to-one marketing, data-driven printing, variable data printing, versioning, or mass customization. Using digital printing methods, "each piece is created dynamically by accessing a database whose fields are tagged to represent blocks of text or specialized images" (Withers, 2000, p. 6).

Variable printing identifies information for each recipient in the target population, and displays unique information on each recipient's printed product. It can vary from somewhat customized to highly customized, based on how it is designed and produced. The goal is one-to-one communication which studies have shown leads to a higher response rate for the materials that are distributed (Lee, 2003).

Summary of Ensuing Chapters

The overall goal is to better understand the needs of the graphic communications industry for personnel, and create secondary and higher education programs to better prepare graduates to meet these needs. In Chapter 2 a review of the literature will be presented, with discussions on those trends and how they have affected graphic communications organizations. Chapter 3 outlines the Methodology that will be utilized in the study, as well as the rationalization for the processes. Chapter 4 was written after the study was finished and the data was collected and analyzed. It provides an analysis and discussion of the results of the study and interviews. Finally, Chapter 5 presents the Conclusions drawn from the results of the study, as well as recommendations for further study.

CHAPTER 2

REVIEW OF THE LITERATURE

Knowledge about the trends affecting the graphic communications industry is vital to understanding the forces, both internal and external, that will have the most significant impact on the personnel needs for the industry. A review of traditional processes is included in this chapter to provide background information and context for the new trends that will be introduced. Personnel roles and positions will be described to better understand the changing requirements for both those continuing to work in and those soon to be entering the graphic communications field.

There are two groups of topics that are explored in the literature review section of this paper. The first group focuses on themes or trends as applied to the graphic communications industry. These include (a) the increasing computerization of the industry, (b) a diversification of products and services that are offered within the industry, and (c) the changing relationship between service providers and customers. The second group of topics focuses on the required skills and knowledge of the graphic communications workforce. Its discussion will include both the technical skills and the "soft" skills of personnel working in the Graphic Communications field.

Background

Graphic communications refers to an industry in which visual imaging is used to convey messages. The area has also been referred to as the graphic arts industry (Prust, 2003) and is sometimes confused with the graphic design field,

the distinction being that graphic design encompasses the creative and origination aspects of graphics, whereas graphic communications is based on the production and delivery of graphic products and messages (Luttropp & Greenwald, 2009). Although graphic arts/communications has been primarily associated with printing technology, it includes much more. Graphic communications is comprised of services for printing, web design, photography, visual signage, textile imaging, product packaging, multimedia production, mailing and fulfillment, and others. The purpose of graphic communications is generally for commercial applications, although it can be for informational and educational reasons as well (Romano, 2000).

Significance of the Graphic Communications Industry

The graphic communications industry is far-reaching and important to the U.S. economy. When considering just the printing and publishing portions of the industry, estimates are that the revenue is between $100 billion ("Industry Profile: Commercial Printing," 2009) and $150 billion annually (Luttropp & Greenwald, 2009). Also, there are from 35,000 ("Industry Profile: Commercial Printing," 2009) to over 40,000 individual companies employing around 750,000 people (Luttropp & Greenwald, 2009). Other figures show more than 80,000 companies employing 1.3 million people in the printing industry, and generating over $200 billion each year (Muldoon, 2009). Additional literature states:

> In 2020 the printing industry will still be a very large industry and continue to rank among the country's largest manufacturing industries. With 27,000 plants and around 850,000 employees, the printing industry will have a large economic footprint and continue to provide career opportunities and hire, on average, approximately 50,000 new employees annually (Davis, 2009b).

To prepare individuals to work in these careers, many post-secondary global institutions need to have effective degree programs. In addition, the industry is in the process of a radical and sweeping change from analog to digital technology with new processes being developed and utilized. Education and training are needed to keep up with these trends. Cutshall (2002) sums it up:

> Meeting the future workforce needs of the graphic communications industry is no easy task. Few industries have seen such dramatic transformations. Today's graphic arts, printing and electronic media workforce must be highly trained and extremely flexible. Further, they will need to commit to a career of continuing education, since the equipment and software they use is constantly being changed and updated (Cutshall, 2002, p. 28).

Industry Trends

Three main themes emerge when investigating the trends in the graphic communications industry. They are: (a) the industry is undergoing a shift from analog to digital processes, (b) there are new ancillary products and services that companies have to consider providing, and (c) the relationship with customers is changing to a more integrated partner status than previously seen (Cross, 2008; Davis, 2009a; Davis, 2009b; Dewitz, 2008; Esler, 2008; Farnand, 2008; Fogel & Grossman, 2009; Gilboa, 2002; Henry, 2007; Hurlburt, 2000; Levenson, 2008; Martin, 2008; Pellow & Sorce, 2003; Prust, 2003; Romano, 2004; Webb, 2006). These themes will be discussed in more detail in the review of the literature.

Going Digital

Converting to digital processes drastically changes the roles and responsibilities of graphic communications personnel. Some have stated it as a change from *craft* to *commodity* (Ryan & Conover, 2004). In addition, it affects

workflow and all the processes included therein. The increased connection to computerization necessitates skills in computer science in addition to the graphic arts. These themes will be further explored in the next few sections.

Conversion to Digital Processes

As with most current technology, printing was initially developed in an analog manner. Tracing printing back to its origins includes mention of Johann Guttenberg inventing moveable type in the 1440s (Luttropp & Greenwald, 2009; Prust, 2003). According to Prust, the current transition to digital processes includes the most *sweeping changes* since Guttenberg's invention, especially in the last 15 years (Prust, 2003). Offset lithographic printing was first used in commercial printing in 1905, became the main/dominant technology in the 1950s, and remains so today (Luttropp & Greenwald, 2009).

Along with the advent of the Apple computer in 1984, desktop publishing was introduced. Digital printing began, and currently accounts for about 5% of today's commercial printing by some estimates (Luttropp & Greenwald, 2009), or up to 12% of the industry by other estimates (Davis, 2009b). "Digital printing can be defined as any reproduction technology that receives electronic files and uses spots (or dots) for replication" (Prust, 2003, p. 196). Companies are adding digital printing to supplement and in some cases replace traditional offset printing (Henry, 2007; Kadam, Evans, & Rothenberg, 2009; Prust, 2003). With the new processes that are being introduced, new skills and knowledge are required (Davis, 2009a; Gilboa, 2002; Pellow, Pletka, & Banis, 2003). According to Muldoon, utilizing the new digital technology "…incorporates skills as diverse

and independent as design, business, engineering, manufacturing, and science" (Muldoon, 2009, p. 21).

One final point by Lee (2003) illustrates the rapid pace of the digital conversion: "Currently, the graphic communications industry isn't going digital – it has gone digital. To face the challenges with electronic media, the graphic communications industry should consider expanding its horizons into new media and adopt most current emerging technologies" (Lee, 2003, p. 26).

Changing Workflow

Due to the increasing digital processes in the graphic communications industry, the corresponding workflow is changing. Due to the fact that printing is a manufacturing-oriented process, it requires a company to "…take in raw materials, convert them into basic components, and then use those components to fabricate a final product" (Withers, 2000, p. 8). All of this necessitates an efficient workflow. According to Withers (2000), "Workflow is a plan of action. It is a strategy for how things get done" (Withers, 2000, p. 2). He also stated that before 1985 "The workflow was controlled by individual artisans who were highly skilled at one aspect of job creation but isolated from the entirety of the job" (Withers, 2000, p. 4). Thomas Ryan, graphic designer, explained:

> I started in a field more than twenty years ago where tradespeople worked their craft with careful and attentive detail. They were typographers, darkroom processors, film engravers, and retouchers – people who were more skilled in production and process than I was. … That was then, this is now. Most of those publishing specialists – engravers, strippers, and typographers – are gone. Today, all or most of those responsibilities are within my control with one or two clicks of the mouse on my Macintosh (Ryan & Conover, 2004, pp. 296-297).

This indicates an inevitable impact on the required competencies of graphic communications personnel. The artisans and tradespeople have had to evolve and learn new skills, or leave the industry. Some aspects of the production jobs have moved to the designers, and vice versa. Prust (2003) agrees that many formerly *craft-centered* jobs have now become more specialized and technical (Prust, 2003, p. 529).

The diagram in Figure 1 illustrates the job processes and relationships between them that typically were present in printing company workflows before 1985.

There were several major characteristics in the traditional workflow. Overall, the creator of the project was not involved in the technical and/or production aspects of the process. The creator was typically a graphic designer or other person who worked outside of the printing company. Another major characteristic of the process was the use of film technology versus digital imaging. This required steps to be performed in a very linear fashion. The type and artwork were created and prepared using different technologies. When they were combined, it proceeded in a series of steps that had to be performed sequentially. For example, the images had to be shot with the camera before the film could be developed, the film had to be processed to expose and create the plates for the press, and so on. Separate individuals in various areas of the organization performed most of the steps according to their specialization (Prust, 2003; Wilson et al., 2009; Withers, 2000).

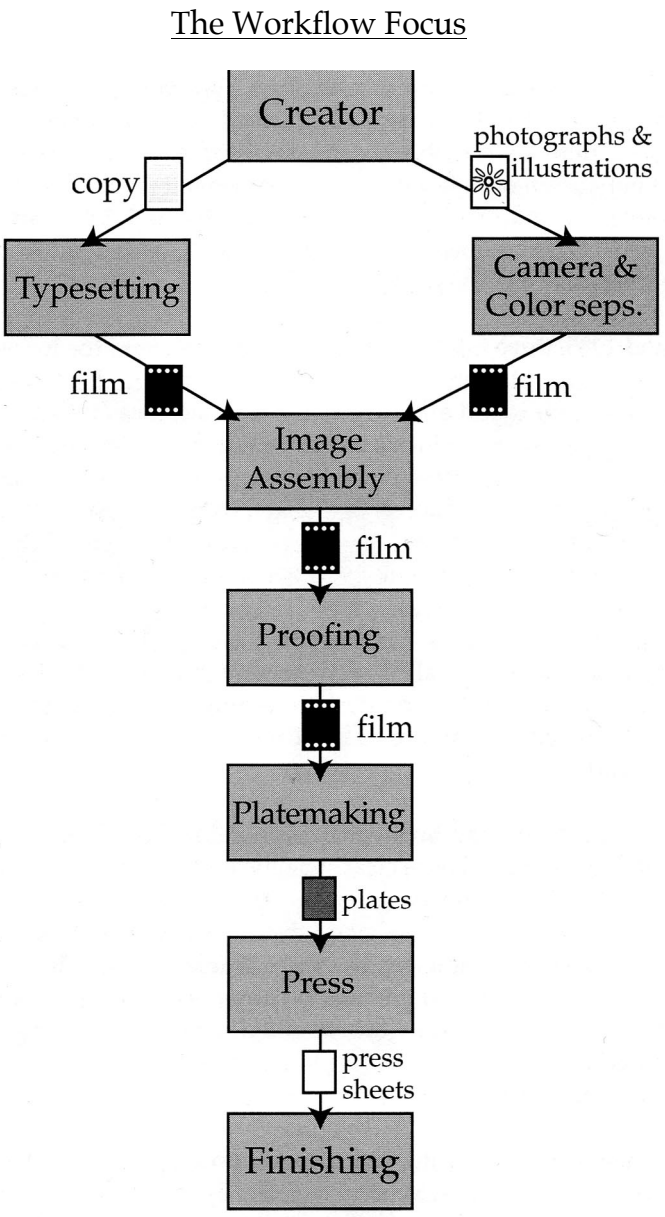

Figure 1. In traditional production workflows, each task was a completely separate operation. (Withers, 2000, p. 3).

The diagram in Figure 2 illustrates a more current, although still highly analog, printing workflow.

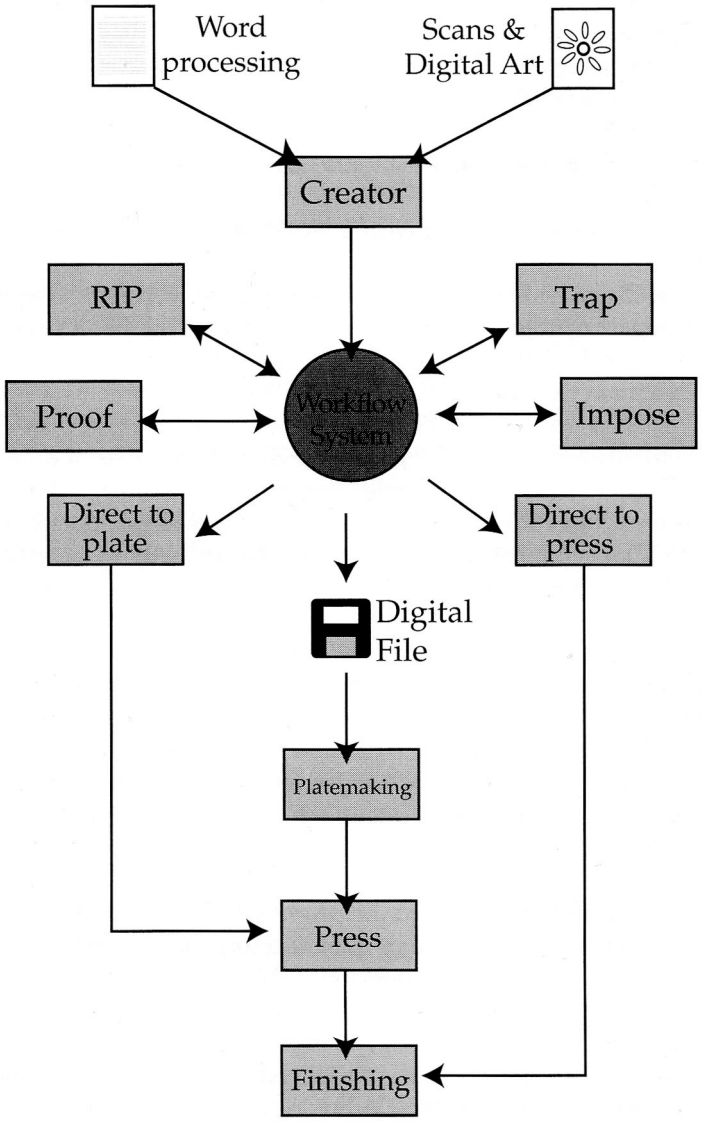

Figure 2. Printing workflow with computer based prepress system. Modern workflows use specialized systems to allow for parallel processes (Withers, 2000, p. 5).

The main difference apparent with this diagram is the potential for separate processes to take place simultaneously. Also, the text and images are

captured and digitized, then combined by the creative (i.e. graphic designer), before the project is brought in to the print service provider.

The portion of this workflow that is still analog is platemaking. This consists of using a photographic process to make a film image of the content to be printed, then using that film to transfer the image to a metal or polyester plate. That plate is then mounted on a press to print the image on paper with ink. In contrast, there were some solutions beginning to offer direct to plate and direct to press options which bypassed the photographic process.

In Figure 3, it's apparent that the customer or client has much more input and control with the overall project. Figure 3 also shows a significant difference with the output of the project. There are three methods of digital output in addition to the traditional ink on paper output, and one example of digitally backing up the files. The digital output methods are: (1) burning onto a CD, (2) publishing the project on the Internet, and (3) transmitting the files over the Internet to the customer or other recipient, to be emailed or used in another format. The backup process is to copy or upload the files into an archival system for later use. The steps in between initial creation and final distribution represent increasingly technical processes. The project stays in digital or electronic format until the distribution at the end, with the possible exception of a printed proof. This diagram shows the proof as being digital as well, meaning that the customer will view it on a computer screen versus printed on paper before giving the approval to output the final postscript files. A more comprehensive and current illustration is in Figure 4.

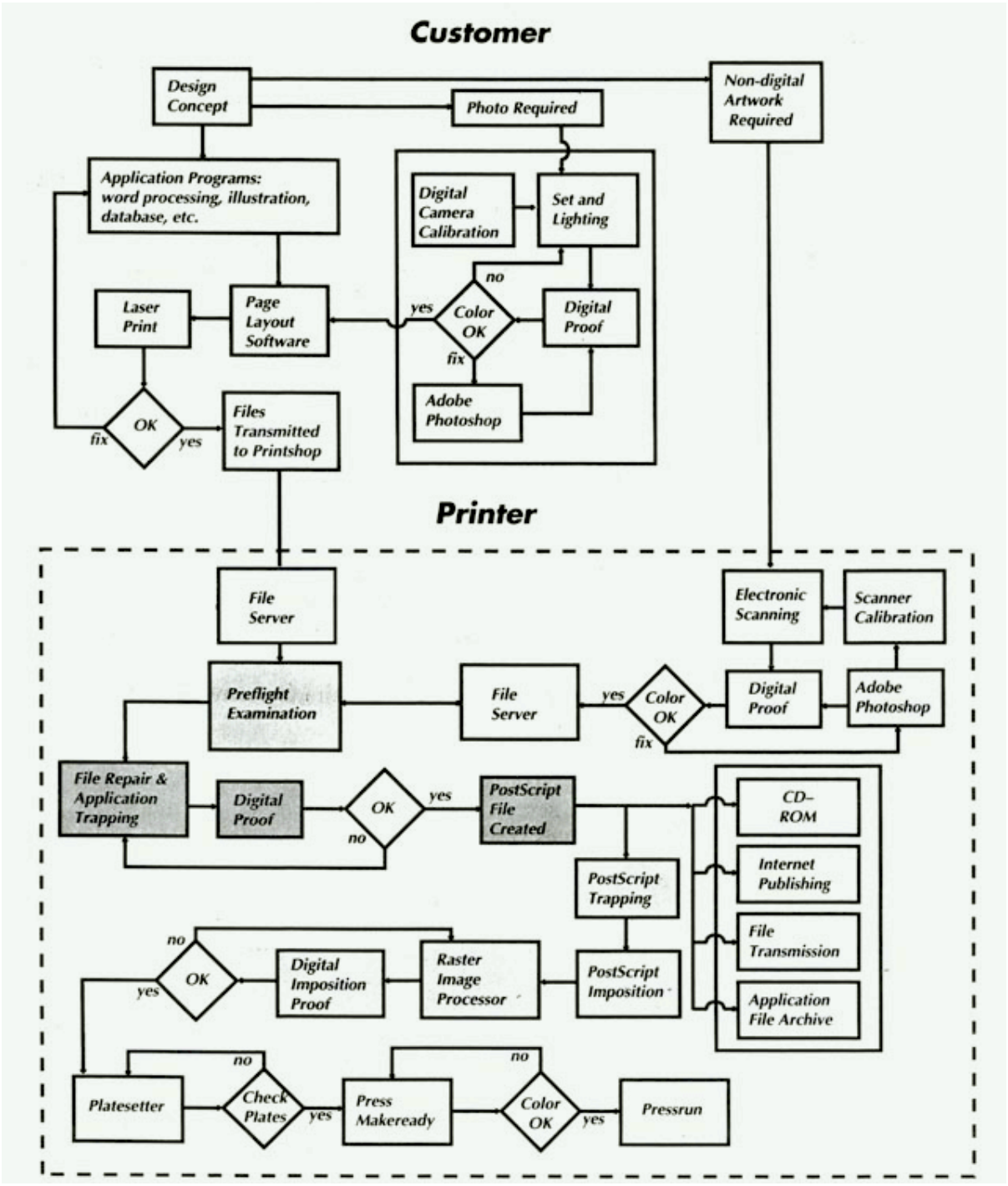

Figure 3. Model of Electronic Prepress Workflow (http://graphics.tech.uh.edu/resources/prePress.php)

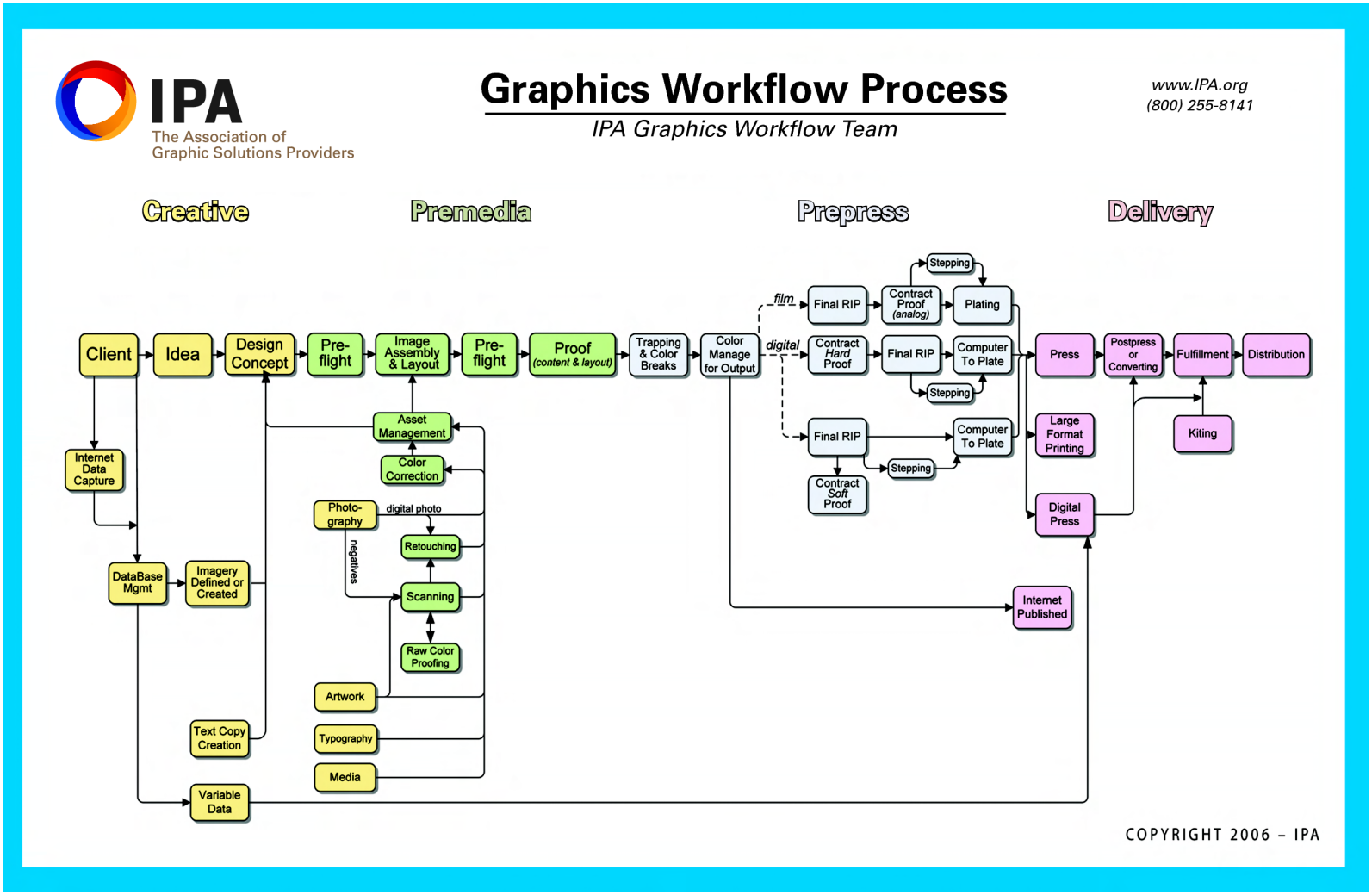

Figure 4 Graphics Workflow Process ("Workflow," 2006)

This diagram shows additional ancillary and new services that are being provided by formerly traditional printing companies. Some of these will be discussed later in this paper in the section under Diversification of Services. For example, in the Creative area, one item is Database Management. This is necessary for services such as Variable Data Printing. In the Fulfillment area, the service of Kiting or creating Kits/Packages of the items that are printed and produced is a service offered by some printing companies. This diagram also illustrates the complexity and variety of skills and positions that are necessary for print and digital output production and management.

Traditionally, and in many cases currently, workflow was/is tracked and controlled by a printed job ticket, with all the specifications for a particular customer project identified, progressing through the various workstations in the organization (Prust, 2003; Withers, 2000). Although the data regarding the job might also be entered into an electronic database, a paper copy still exists in a folder, pouch or jacket and follows the job through the organization (Prust, 2003; Withers, 2000). It is created when a customer brings the project to the printer. The job ticket may be created by personnel in the planning and purchasing departments, or sales and production people (Prust, 2003).

In addition to the folder or pouch system, the job ticket is increasingly in electronic format, integrated into a system known as Job Definition Format or JDF. Buckwalter (2005) explains: "… JDF specifies a solution for integrating all systems in the print production workflow, from prepress, through press, to postpress, including the management information systems (MIS) monitoring and

controlling the workflow" (Buckwalter, 2005, p. 2). Often, the job ticket is a hybrid of analog and digital. The reality is that there are material items that are needed for a job, i.e. computer disks, proofs, and others. These continue to get passed from one process to another physically, while the instructional information and specifications remain digital and are accessed by devices and/or operators (Withers, 2000).

The JDF job ticket contains two main views or ways of describing and working with a print job. Those are the Product and the Process views. The Product view or "intent" describes the outcome of the job as seen by the end-user or print buyer (Harvey, 2002; Herriot, 2004; O'Brien, 2004). For example, O'Brien describes a "32-page A4 folded to an A5 saddlestitched brochure, black only text, on 100 gsm paper, with a four-color front and back cover on 100 gsm coated cardstock" (O'Brien, 2004, p. 27). This is what the customer would be expecting upon completion of the job. The Process view describes how the job will be produced as it goes through the distinct processes required. For maximum efficiency, the correct printer needs to be selected (i.e. digital or offset, which digital printer, etc.), jobs need to be scheduled based on priority, sheet size and other job specifications need to be identified. These are part of the Process view of the job ticket. Every step and action that needs to be taken to complete the job must be spelled out (Buckwalter, 2005; Harvey, 2002; Herriot, 2004; O'Brien, 2004). This information can come from a variety of sources, including being automatically entered from meta-data, set as the default within the system, with customer input via the Internet, and manual entry (Harvey, 2002, p. 2).

JDF uses a messaging protocol known as Job Messaging Format (JMF) to give instructions to each device along the production series. The messaging is based on XML coding, making it possible for the JDF "language" to "talk" to many devices from different manufacturers (Buckwalter, 2005; Eskildsen, 2006; Gehman, 2005; Herriot, 2004). According to Herriot, "The JDF software that controls the production process also will do a better job than humans of optimizing equipment use" (Herriot, 2004, p. 34). Whether or not one agrees with this statement, it signals an impact on the personnel in the graphic communications industry.

JDF represents a large potential, and need, for skills in computer science to be added to the personnel in the graphic communications industry (Harvey, 2002; O'Brien, 2004, p. 26). Because JDF is not a piece of hardware or specific software, but rather a series of protocols to make heterogeneous devices work together, computer programming is needed.

E-commerce and Web to Print. E-commerce is also having an impact on the graphic communications industry. A process known as web-to-print is now utilized by successful printers (Cross, 2008; Dewitz, 2008; Levenson, 2008; Parsons, 2006; Pellow et al., 2003; Pellow & Sorce, 2003; Vruno, 2008). In this process, customers log in to the printing company's web site, upload their files, choose their options, and submit the request to have their job printed (Wilson et al., 2009). Adi Chinai, joint managing director at King Printing, Lowell, MA, describes the process as a nearly *lights out* workflow, with customers using a

front-end system to upload files that are sent directly to a press. Proofing is the only human intervention in the workflow (Cross, 2008).

Web-to-Print can serve as a user-friendly front end to generate the data needed for beginning a job that utilizes JDF. At the same time, Web-to-Print is a solution that can help companies reduce cost, as well as improve efficiency, communication with customers, accuracy, and accountability. In addition, it can help companies streamline their processes (Dewitz, 2008; Prust, 2003).

Print on demand. Customers are also expecting and utilizing the service of Print on Demand (Gilboa, 2002; Henry, 2007; Levenson, 2008). In the past, customers would place large orders for collateral marketing materials such as letterhead, business cards, and others. It would take weeks to get them printed, and they then maintained an in-house inventory of those items. Currently, the overall trend is to print much shorter *runs* or quantities of printed items only when needed (Cross, 2008; Gilboa, 2002; Henry, 2007; Levenson, 2008; Romano, 2004; Vruno, 2008). In fact, an influx of *little bitty short runs* led to Erik Von Colln's decision to purchase two new digital presses for his company, Midtown Printing, in Nashville, TN (Henry, 2007). One reason for the shorter runs is that digital printing is not more cost-effective with larger runs, as is offset lithographic printing. With offset lithography, the greatest cost is upfront for the preparation or *make-ready* time. With digital printing, the upfront work has been greatly reduced, with each successive printed page still costing the same (Henry, 2007; Pellow et al., 2003). Customers are also expecting to have jobs completed with a much shorter turnaround time (Gilboa, 2002; Henry, 2007; Levenson,

2008). The overall effect of going digital in the graphic communications field is that companies have technology and processes for better responding to customer's needs. This is necessary due to the fact that consumers, even of information, are now in charge of how, when, and where they access information (Webb, 2006).

Distributed printing. Traditionally, jobs that are brought into a printing company are printed and distributed from that point. In previous Figures 1-4, all of the flow charts indicate some method of printed distribution. Figure 3 includes File Transmission as a delivery method. Using this process, a job can be distributed in electronic format to another location where it is printed and distributed (Dewitz, 2008; Romano, 2004; Vruno, 2008). This workflow has been described as "print's great paradigm shift," or, distribute-and-print (Cummings & LeMaire, 2006, p. 3).

Diversification of Products and Services

The introduction and widespread use of digital printing has paved the way for a variety of new products and services to be offered to customers of graphic communications companies (Davis, 2009b; Fogel & Grossman, 2009; Gilboa, 2002). Ancillary products and services are those outside of the nature of the traditional printing ink or toner on paper. These additional non-print and variations on print services can add a significant amount of income to a business (Davis, 2009b; Pellow & Sorce, 2003; Romano, 2000; Watterson, 2007). Ancillary services currently account for 12% of total printing industry annual shipments, or $20 billion. By 2020, ancillary services are projected to grow 50% to an

additional $5 billion (Davis, 2009b, p. 3). Examples of ancillary services include variable data printing, creative design, web design and implementation, mailing and fulfillment, and interactive media (Brunner, 2007; Levenson, 2008; Romano, 2004; Watterson, 2007). By adding ancillary services, companies will be utilizing a combination of analog and digital, traditional and new technologies. Organizations will be going after additional business by providing a *one-stop shop* so that their customers can get their needs met in one place (Davis, 2009a; Levenson, 2008).

A widespread service predicted to be the medium of a major communication trend is the process of personalizing products that are sent to individuals. This process goes by many names: one-to-one marketing, one-to-one micro-communication, data-driven printing, variable data printing, versioning, or mass customization (Brunner, 2007; Frey & Barzelay, 2008; Lee, 2003; Romano, 2004). Variable data printing is different from traditional printing in that each printed page is unique. There is a variation in the text, images, or a combination of these that was not present in traditional printing methods such as offset lithography. The variations can range from minor changes, i.e. name and address, to being almost completely different layouts (Lee, 2003; Wilson et al., 2009; Romano, 2000).

Variable data printing has brought the requirement of a new group of skills and abilities to the printing workforce. Workers need to be able to manage data and digital content (Frey & Barzelay, 2008) and provide or capitalize on *value-added designing* (Lee, 2003). According to Romano (2000), "Finding qualified

operators may be the most insurmountable barrier to starting a variable-printing operation" (p. 233). In addition, businesses will have to change their culture and practices in order to be successful with variable data printing (Brunner, 2007; Parsons, 2006) According to Watterson (2007) graphics service providers will not only need to know the characteristics of their customers, but their customers' end-user as well (Watterson, 2007).

Other areas of ancillary services provide opportunities in addition to variable data printing. These include different printing technologies such as pad printing and dye sublimation. In addition, they include non-print services such as mailing and fulfillment, database management, Digital Asset Management (DAM), content management, creative services, photography, workflow management, business and marketing consulting, web portals, broadcast, marketing campaign management, and repurposing (Davis, 2009a; Frey & Barzelay, 2008; Pellow & Sorce, 2003; Wilson et al., 2009; Withers, 2000, p. 25). In-depth discussion of these services is beyond the scope of this research.

Evolving Customer Relations

Partnership Status

Based on all of the technological and process-oriented changes in the graphic communications industry, it stands to reason that procedural and relationship changes need to occur as well. Many experts agree that printing companies and other types of graphic communications organizations develop a different type of relationship with their customers, one that is more partner-based versus merely bidding on jobs. A key theme is becoming a marketing

solutions provider and offering a range of products and services, in addition to printing on paper. Successful companies will strive to become preferred vendors with their customers (Davis, 2009b; Khazanchi, Slay, & Sheep, 2008; Parsons, 2006; Riordan, 2006; Withers, 2000). Marketing services providers get to know their customers, and guide them in planning and executing the best strategies, including both print and online (Koenig, 2013). Additional descriptors for these companies include "Marketing Logistics Firms" or Media Services Companies" (Wilson et al., 2009, p. 114).

Another aspect of the changing relationship between the print/service provider and their customers relates to timing. In the past, customers would often choose a print or media provider based strictly on cost. The printer was not consulted until the job was ready to print. Now, the print provider is brought in much earlier. They are considered more of a consultant or partner with their customers, in the role of problem solving and understanding the needs of their customers (Davis, 2009b; Fogel & Grossman, 2009; Pellow et al., 2003). When brought in, they are also given access to personnel higher up in the customer organization, often those with more authority for making decisions. This gives the graphic communications company an opportunity to suggest "higher end value-added products and services" (Davis, 2009b, p. 5).

Delineating Production Responsibilities

While overall the relationship between the service provider and customers is collaborative, there are issues with defining the responsibilities of provider and customers. O'Neill et al. (2007) describe this relationship as an

"asymmetrical collaboration," with the bulk of the work being done by the graphic communications company to make the collaboration successful (O'Neill et al., 2007, p. 232). This is due in part to the fact that more sophisticated computers and software enable more people with varying amounts of experience and training to prepare documents, which decentralizes the prepress work that is being done. As documents are brought in from creative agencies, advertising agencies, and other imaging professionals, they may or may not follow the guidelines for production. This creates a situation in which service provider personnel need to fix file issues in order to make the printing successful (O'Neill et al., 2007; Prust, 2003; Ryan & Conover, 2004).

Digital Communications

As previously noted, part of the workflow for print production includes the customer viewing and approving a draft of the final project. Increasingly, this proof is no longer printed. Providing that sophisticated systems with proficient operators are used to produce them, digital proofs can be extremely accurate (Prust, 2003; Withers, 2000). Once the proof is created, it is fairly common practice for the proof to be sent as a digital image to the customer over the Internet. Moving a portion of their business to the web has been a significant factor in the success of graphic communications companies (Pellow & Sorce, 2003).

Workforce Attributes

An organization's workforce can contribute to a significant competitive edge, especially in highly technical areas such as the printing industry (Boohene,

2011; Mundschenk & Drexl, 2007). Educational programs are addressing a variety of skills and knowledge to prepare students to enter the workforce. Some are led by their industry advisors to merge skills together from multiple areas, such as photography, web design, and graphic design (Walbert, 2010).

This section will explore some of the factors for employee requirements in the graphic communications industry. The two categories are technical skills and non-technical or "soft" skills.

Technical Skills

In order to have a successful career working in graphic communications, a range of technical skills is required (Harris, 2009; Higgins, 2008; Jessee & Wiebe, 2008; Luttropp & Greenwald, 2009; Muldoon, 2009; Romano, 2004). Printing is "…intensely technological, increasingly shaped by networked digital workflows and computerized processes at every stage of production" (Hurlburt, 2000). This concurs with assertions by Prust (2003) that information management positions are being created. This is due to the increase in digital workflows and methods of communication. The fact that increasing computer skills are needed is also supported with the trends previously discussed in this Literature Review chapter. For example, Web to Print, E-Commerce, Distribute and Print, and others, are computer-dependent technologies.

Within the graphic communications industry, the areas or departments in an organization are generally organized by work divisions or profit centers. These are most commonly identified as Creatives, Prepress/Premedia, Press, Post Press (Finishing and Bindery), Distribution, and Administrative, which can

include Sales, Marketing, Customer Service Representatives, and upper management (Cutshall, 2002; Dolin, 2006; Kipphan, 2001; Prust, 2003; Withers, 2000). This also coincides with the workflows presented earlier in Figures 3 and 4. For the purposes of this discussion, the categories utilized will be Creatives, Prepress, Press, PostPress, Distribution, and the others will be combined into Administration. According to Mundschenk and Drexl (2007), "The various processes a job has to pass through until its delivery is handled by jobholders of different occupational groups…Within each occupational group there are grades of qualification…" (Mundschenk & Drexl, 2007, p. 4852). Some of those specific jobs and processes will now by discussed, based on the categories identified.

Creatives. The first step of the workflow is the creation of the item to be printed. Typically the conception, writing, imaging, and layout of this job are all done by graphic designers or others who work outside of the printing organization (Prust, 2003; Ryan & Conover, 2004; Wilson et al., 2009). According to O*Net Online, graphic designers "Design or create graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos. May use a variety of mediums to achieve artistic or decorative effects" ("Summary Report for: 27-1024.00 - Graphic Designers," 2010).

Administration. Once the images and layout are designed and created, and the project is ready for printing and/or electronic distribution, it goes to administrative personnel at the printing organization. The specifications of the job are prepared by a Customer Service Representative (CSR) or salesperson, the job is quoted by an estimator, scheduled by a supervisor or manager, and then

sent to Prepress. The CSR will continue to oversee the job at that point (Wilson et al., 2009).

The technical skills and abilities required by Administrative personnel include:

- Basic understanding of various printing methods and preparation activities for each
- Understanding of the steps and processes required for various finishing, binding, and distribution options
- Ability to estimate the cost and length of time for production and distribution
- Ability to use cost estimating software
- Ability to use job workflow software

Prepress or Premedia. After the project has been created, reviewed and processed by Administrative personnel, it goes to the Prepress department. Waite (2006) suggested that due to a trend in printing companies to downsize prepress departments, a larger portion of the steps to prepare a file to print are now in the hands of a graphic designer. Prepress departments are concerned with performing the functions of preflighting, imposition, trapping, RIPping, proofing, and platesetting. In addition, they need to be able to explain these functions to customers, especially graphic designers. The skills involved in these functions include:

- Troubleshooting and analytical skills for preflighting, which is checking files for problems that will keep it from printing successfully
- Imposition requires knowledge of the printing process including the size of sheet (substrate) the images will be printed on, and creating a layout using specialized software to put the images in a layout correctly so that the pages will end up in the proper sequence (Wilson et al., 2009)
- Trapping involves using specialized software and color management techniques on files where more than one color will be used. Trapping is necessary due to slight misregistration that occurs on a press (Wilson et al., 2009)
- RIPping requires the technician to be able to use specialized software to send the corrected files to a Raster Image Processor which creates a specific type of file to go on the press.
- Proofing is the process where the technician creates a sample, or Proof, of the finished job. This will be viewed and approved by the customer before the job is finished (Wilson et al., 2009).
- Platesetting refers to the process of imaging the file to be printed onto a plate that will go on a printing press. Traditionally, this requires the technician to use a complex photographic process to image and develop a metal plate. More recently, the technology allows technicians to send the files from computer-to-plate,

> bypassing the photographic steps (U.S. Department of Labor, 2012; Prust, 2003). Many new digital presses also allow the files to be sent directly to the press, eliminating the need for platesetting all together (U.S. Department of Labor, 2012).

Prepress Technicians must also be able to explain and discuss the processes of creating and formatting vector and pixel-based images and creating page layouts based on industry standards (Waite, 2006). These standards include the color management designations of Specifications for Newsprint Advertising Production (SNAP), General Requirements for Applications in Commercial Offset Lithography (GRACoL), Specifications for Web Offset Publications (SWOP), and Flexographic Image Reproduction Specifications and Tolerances (FIRST; Waite, 2006). These specifications all contain sets of characteristics that designers and technicians use to maintain color consistency from image conception through production.

In addition to Prepress personnel, Waite (2006) suggests that this knowledge and the ability to discuss it with customers also include technicians, sales support personnel, supervisors and managers within the graphic communications industry.

Printing or Production. Once the project has been processed by Prepress personnel and approved by the customer for production, it progresses to the Print department. According to the "Occupational Outlook Handbook, 2012-13 Edition, Printing Workers" a Print operator needs to be able to “prepare, run, and maintain printing presses” (U.S. Department of Labor, 2012). The specific tasks

vary greatly depending on the printing technology being utilized. Prust (2003) maintains that for Printing personnel, quality control is imperative, and a knowledge of ink, paper, and press operations is essential.

Wilson et al., (2009) identify the basic processes in this department as: Makeready, Pressrun, and Washup. The skills and abilities required for these functions are as follows:

- In Makeready, a print operator prepares the press for a job's specifications. For a non-digital press, this includes inking the press, mounting the plates, loading the paper, registering images, and achieving proper ink levels. For a digital press, this includes loading the correct consumables such as paper and toner or other type of imaging medium.
- During the Pressrun, the required number of finished copies of the final product is printed. The operator must maintain ink and paper levels, as well as provide quality control.
- In the final step, Washup, the press and plates are cleaned and the ink is removed. The operator must have knowledge of proper maintenance of the press including any other cleaning or adjustments that need to be made.
- In addition to the previous skills, the press operator must exhibit attention to detail and possess accurate color perception.

Finish and bindery. Once a project is printed, it still has more processes to go through before it is completed. These are done in the Finish and Bindery

department (Wilson et al., 2009). In this department, personnel "combine printed sheets into a finished product, such as a book, magazine, or catalog" (U.S. Department of Labor, 2012). The specifics of these activities vary depending on the project that is being completed. The steps of folding, trimming, and binding require personnel to operate specialized equipment for folding, cutting, stapling, and binding paper together. It can also include collating, laminating, gluing, varnishing, embossing, and diecutting (Wilson et al., 2009).

Distribution. Finally, the project will be distributed to an audience, either the customer or a group designated by the customer. Traditionally, this involves physically mailing pieces through the U.S. Postal Service. Skills and abilities required for distribution personnel include the ability to:

- Print addresses on envelopes, print address labels and run machinery to attach to envelopes, run equipment that will insert letters in envelopes, or do any of these processes manually.
- Use shrink wrap equipment to make bundles of finished printed products.
- Knowledge of courier services and their specifications.
- Sort mail according to U.S. Postal regulations.
- Load and drive a large vehicle for delivery of product to the customer or Post Office.

As this discussion of technical skills illustrates, the current field of graphic communications requires personnel to have both an understanding of and capability with processes and equipment that are increasingly computer based.

At the same time, it is important to have knowledge of traditional processes as these still form the basis of current procedures. Another aspect of this discussion is the fact that there are many dissimilar skills and understandings required for the various positions. In the following discussion on soft skills, the requirements contain much more similarity amongst the positions.

Soft Skills

The workforce of the near future is expected to have many people self-employed or working as freelancers, with 28% of U.S. companies planning to hire freelancers in 2009 (2009 U.S. Hiring Forecast, n.d.). Professionals will also have multiple jobs and careers, as compared to the relatively stable and unchanging careers of their parents and grandparents. Permanent jobs are going away; today, 22 million American workers are *free agents* (Brannan, 2007). In addition, many people will be working in *virtual teams.* These factors combined suggest a need for graphics professionals to have competencies in project management, communication, leadership, and cultural awareness and sensitivity (Clough, 2008; Harris, 2009). Prust (2003) identifies specific attitudes and abilities needed for successful employment as entrepreneurs:

- A self-starter
- In good health
- Self-confident
- Able to differentiate a calculated risk from foolish chance
- Responsible and hard-working
- Able to motivate and utilize workers' talents (p. 537)

A study by Higgins (2008) measured some of these job preparedness competencies. Based on ratings from both employers and university alumni, data showed that graduates were lacking in communication skills, project estimating and management skills, and the ability to work with clients. However, the strengths identified were the ability to follow a project through to completion and the capability to work in teams (Higgins, 2008).

Prust (2003) identified various soft skills specifically needed for management personnel:

- Ability to work in a team to accomplish the goals of the company
- Demonstrate communication, cooperation, and understanding between departments
- Accept responsibility for ensuring that a job gets done right and on time

For the many and varied skills and abilities that future graphic communications professionals will need, Debra Van Opstal, senior vice president of programs and policy with the Council on Competitiveness, sums it up well:

"Graduates who want to compete in the global economy need to be innovative and entrepreneurial, with a focus on value creation. They also need leadership skills and the flexibility to adapt quickly as the pace of change accelerates" (Harris, 2009).

Summary

The quantity and nature of the trends affecting the graphic communications industry will have a profound impact on the ability of its

personnel to be best equipped for success. In addition, there is a serious lack of data on forecasting the degree to which personnel in the graphic communications industry may require specific skills and competencies in the next ten years.

CHAPTER 3

METHODS

Introduction and Overview

Due to the nature of the research questions, the design of this study included both a quantitative and qualitative phase. The quantitative phase utilized a cross sectional survey to determine future trends for the graphic communications industry and their implications for future personnel needs, as forecasted by professionals in commercial printing organizations. The qualitative phase included some open-ended questions on the survey, as well as personal phone interviews with participants from a sub-group of the sample. The qualitative phase affords an opportunity to collect a depth of data beyond that possible with the quantitative survey design.

This chapter will provide both an overview and discussion of the research methodology, sampling techniques, instrumentation, procedure, and data analysis of both phases.

Research Methodology

The research methodology for this study was a mixed methods approach known as sequential explanatory strategy. In this approach, the researcher collects both quantitative and qualitative data in sequential phases, using the results of the first phase to guide the procedure of the second phase. The second, qualitative, phase also helps to elaborate on and explain the results of the first,

quantitative, phase. "Thus, the two forms are separate but connected" (Creswell, 2009, p. 211). A visual map of this process can be seen in Appendix A.

Quantitative data is based on a philosophy that humans can view phenomenon while remaining separate from it. Variables are present that may experience changes when acted upon. Quantitative research is generally used by a researcher who holds a philosophical worldview such as Postpositivism or Pragmatism. Quantitative data are generally collected with instruments which allow numerical data to be analyzed using statistics (Creswell, 2009; Johnson & Onwuegbuzie, 2004; Locke, Silverman, & Spiriduso, 2010).

Alternatively, Qualitative data is based on a philosophy known as Postmodernism, which negates the idea that reality is "out there," waiting to be discovered, as is suggested by Postpositivism or Pragmatism. Another contrast with quantitative research is that in Qualitative research the *quality* of the data collected is more significant than how often something occurs or other means that measure results numerically (Fraenkel & Wallen, 2009).

When choosing a mixed methods strategy, a decision is made as to the weight or priority of each method. Creswell (2009) refers to this phenomenon as *capitalization*. The researcher decides whether each method carries the same weight, or one is given priority over the other (Creswell, 2009). In this study, all of the results collected were given equal weight and used in combination to interpret the answers to the Research Questions.

Both research approaches were necessary due to the fact that a complete understanding of the issues cannot be obtained with just one method. The

qualitative phase can help explain results from the quantitative phase (Creswell, 2009). Researchers disagree on the value and description of mixed methods research (Fraenkel & Wallen, 2009). Fraenkel and Wallen (2009) also note that specific methods of data collection are not unique to either qualitative or quantitative research. Interviews, observation, and other types of instrumentation are used in both methods. It is the "manner, context, and sometimes intent" of each that differentiates the approach (Fraenkel & Wallen, 2009, p. 557).

The two data collection methods that were used in this study were a survey instrument and personal interviews. By using a mixed-methods approach, investigators "…work to provide the best understanding of a research problem" (Creswell, 2009, p. 11). This approach also allows researchers to draw on both the strengths and weaknesses of both methods and utilize them across a study (Johnson & Onwuegbuzie, 2004).

Advantages and Disadvantages of a Mixed Methods Approach

"A key feature of mixed methods research is its methodological pluralism or eclecticism, which frequently results in superior research (compared to monomethod research)" (Johnson & Onwuegbuzie, 2004). While purists of both qualitative and quantitative approaches view them as completely opposite, Johnson and Onwuegbuzie (2004) presented the idea that the two approaches are ends of the same spectrum, with mixed methods approaches in between. Alternatively, they presented the idea that mixed methods is a third option, for those who chose to view the approaches categorically.

Disadvantages of this approach include additional time, skill, and consideration for the data collection and analysis phases (Creswell, 2009).

Sampling Techniques

Identification of the Population and Sample

The population selected for this study was graphic communications professionals throughout the United States. More specifically, they were companies identified as commercial printing organizations, as categorized with the government's NAICS code 32311. The National Association for Printing Leadership (NAPL) estimated that this grouping comprises over 31,000 establishments throughout the U.S. (Hall, 2013). The population is made up of many smaller establishments, with over 82 percent having 20 or fewer employees, and 70 percent having 10 or fewer (Hall, 2013). Conversely, those with 100 or more employees make up just four percent of the industry, but account for nearly half of all industry sales (Hall, 2013).

Not surprisingly, the establishments are not evenly distributed throughout the states. In order to more accurately represent the population, a report from the 2010 Print Markets Atlas (2009 Print Market Analysis, n.d., p.87), as seen in Table 1, was used to determine the percentage of establishments per state as compared to the total. These percentages were used to select the number of participants invited to respond to the survey. For example, Alaska has 59 printing establishments out of 33,565 total commercial printers according to this data. That is .18% of the total. When applying that to the total number of participants chosen for the sample group, 300, that equals one establishment

from Alaska to be invited to participate. For Wyoming, the percentage of .15 equaled less than one out of 300. The number was rounded up to one rather than omit the state from inclusion. The rest of the resulting numbers can be seen in Table 2.

Table 1. *2010 U.S. Print Markets Atlas*

2009 U.S. Print Markets						
State	**Establishments**		**Employment**		**Shipments ($m)**	
		Rank		***Rank***		***Rank***
AK	59	50	3,110	42	$538.20	40
AL	291	29	9,500	27	$1,510.87	27
AR	240	32	7,653	30	$1,290.28	29
AZ	487	23	8,713	28	$1,233.96	30
CA	5,586	1	109,005	1	$16,097.19	1
CO	515	21	11,810	23	$1,799.42	24
CT	522	20	14,433	20	$2,219.43	20
DC	75	49	1,539	50	$232.72	49
DE	83	47	2,213	46	$357.64	46
FL	1,210	8	25,605	12	$3,883.89	12
GA	666	16	19,041	18	$2,971.43	18
HI	78	48	1,605	49	$212.99	50
IA	376	25	11,742	24	$1,802.83	23
ID	102	42	2,893	44	$464.68	44
IL	1,915	3	60,485	3	$9,389.91	4
IN	737	12	21,154	13	$3,258.62	14
KS	354	27	12,789	22	$2,049.83	22
KY	327	28	11,502	26	$1,768.51	25
LA	265	30	7,257	31	$1,206.01	31
MA	984	10	29,093	10	$4,562.61	10
MD	657	17	20,987	14	$3,061.45	17
ME	152	37	5,660	35	$942.33	35
MI	1,043	9	25,925	11	$3,917.55	11
MN	737	13	34,411	9	$5,597.04	9
MO	721	14	19,814	16	$3,071.45	16
MS	145	39	4,097	38	$628.00	39
MT	95	45	2,038	47	$309.89	47
NC	712	15	20,788	15	$3,341.82	13
ND	85	46	1,707	48	$255.60	48

Table continues

State	Establishments		Employment		Shipments ($m)	
		Rank		*Rank*		*Rank*
NE	235	33	6,287	33	$997.34	32
NH	186	35	5,560	36	$883.25	36
NJ	1,568	7	37,628	7	$5,792.57	8
NM	173	36	2,692	45	$383.23	45
NV	131	40	5,695	34	$945.41	34
NY	2,591	2	65,253	2	$9,988.35	2
OH	1,686	6	46,422	5	$7,117.66	5
OK	360	26	6,560	32	$960.81	33
OR	452	24	11,561	25	$1,756.67	26
PA	1,812	4	60,001	4	$9,414.29	3
RI	151	38	3,138	40	$469.87	43
SC	246	31	8,219	29	$1,388.94	28
SD	100	44	3,086	43	$522.42	41
TN	497	22	19,180	17	$3,081.84	15
TX	1,790	5	40,081	6	$6,016.94	7
UT	195	34	5,244	37	$799.90	37
VA	551	19	14,165	21	$2,122.97	21
VT	101	43	3,129	41	$492.59	42
WA	592	18	17,168	19	$2,797.70	19
WI	762	11	36,802	8	$6,030.50	6
WV	115	41	4,007	39	$635.68	38
WY	52	51	732	51	$99.67	51
Total	**33,565**		**909,179**		**$140,674.74**	

Utilizing data from Printing Industries of Midlands (PIM), 100 companies from multiple states were identified for survey participation. They included: Iowa, Minnesota, South Dakota, North Dakota, and Nebraska. In addition, 250 companies from all over the U.S. were used from the list of Printing Impression's Top 400 U.S. Print Markets. Only those organizations identified as commercial printers were included. Organizations with other primary business specialties, such as wide format printing or screen printing, were not included.

Table 2. *Percentages and numbers of commercial printers determined for sample population.*

2009 U.S. Print Markets			
State	**Total Establishments**	**Percentage of total**	**Number per state out of 300 for sample**
AK	59	0.18%	1
AL	291	0.87%	3
AR	240	0.72%	2
AZ	487	1.45%	4
CA	5,586	16.64%	50
CO	515	1.53%	5
CT	522	1.56%	5
DC	75	0.22%	1
DE	83	0.25%	1
FL	1,210	3.60%	11
GA	666	1.98%	6
HI	78	0.23%	1
IA	376	1.12%	3
ID	102	0.30%	1
IL	1,915	5.71%	17
IN	737	2.20%	7
KS	354	1.05%	3
KY	327	0.97%	3
LA	265	0.79%	2
MA	984	2.93%	9
MD	657	1.96%	6
ME	152	0.45%	1
MI	1,043	3.11%	9
MN	737	2.20%	7
MO	721	2.15%	6
MS	145	0.43%	1
MT	95	0.28%	1
NC	712	2.12%	6
ND	85	0.25%	1

Table continues

2009 U.S. Print Markets			
State	**Total Establishments**	**Percentage of total**	**Number per state out of 300 for sample**
NE	235	0.70%	2
NH	186	0.55%	2
NJ	1,568	4.67%	14
NM	173	0.52%	2
NV	131	0.39%	1
NY	2,591	7.72%	23
OH	1,686	5.02%	15
OK	360	1.07%	3
OR	452	1.35%	4
PA	1,812	5.40%	16
RI	151	0.45%	1
SC	246	0.73%	2
SD	100	0.30%	1
TN	497	1.48%	4
TX	1,790	5.33%	16
UT	195	0.58%	2
VA	551	1.64%	5
VT	101	0.30%	1
WA	592	1.76%	5
WI	762	2.27%	7
WV	115	0.34%	1
WY	52	0.15%	0
Totals	**33,565**		**300**
Adjusted Totals	**33,565**		**301 (after increasing WY to 1)**

Initially, email addresses were going to be obtained to simplify the process of inviting participants to complete the survey. Various people at PIM

were contacted to request email addresses for their members. However, their organization guidelines did not permit releasing that information. In addition, members at the Association for Technology, Management, and Applied Engineering (ATMAE) were contacted for individuals to add to the mailing list. After repeated attempts, there was no reply from ATMAE. Research librarians at the University of Northern Iowa were asked to help locate listings of commercial printers with email addresses for their owners and managers. After extensive searching, it was determined that those were not available.

Another avenue considered was purchasing a mailing list with email addresses. This was determined to be quite costly. In addition, concerns were raised regarding whether or not the invitations would reach the appropriate individuals in each organization. Due to the chance of emails getting stopped by SPAM filters, administrative assistants screening emails, and other possible issues, it was decided not to use this service -- the cost and risks involved were too great.

Once it was determined how many establishments were available in each state from the PIM and Printing Impressions lists, the rest of the organizations were identified by performing Google searches per state. This resulted in not using many from the PIM listing, due to the fact that there were surpluses of organizations in several states while others lacked proper representation. For example, there were more than enough companies in the listing from Illinois, while far too few from California. Additional addresses and contacts had to be

individually looked up by state and manually entered into the database for the final mailing list.

The sample, therefore, while still including commercial printing managers and owners throughout the U.S., included postal mailing addresses versus email addresses. In addition, 246 of the 301 in the final listing had an actual person's name. The rest were addressed to "Owner/Manager" at specific company addresses. After running the database through the mail checking program at the service provider before being taken to the post office, it was found that none of the contact names were incorrect or undeliverable. The first invitation to be sent out, the mailer, can be seen in Appendix F. The second invitation to go out, a postcard, can be seen in Appendix G.

Instrumentation

Design and creation. The questionnaire was created as an electronic instrument that could be accessed over the Internet. The online questionnaire was chosen for cost considerations, as well as increasing ease of use for both collecting and analyzing the data. In terms of ease for subjects, it was predicted that respondents would be less likely to fill out and mail back a multi-page printed survey. The final draft can be seen in Appendix B. For data analysis, the survey web site, SurveyMonkey.com, had built-in tools with charting and graphing features for processing the results of the survey. In addition, it contained export options to process the data in other software programs.

While the online format did limit participation to only those companies with Internet access, this was considered to be an acceptable limitation.

Development of the Research Instruments

Quantitative phase. The online survey instrument was developed based on the research questions, existing examples of surveys, and the information discussed in the literature review. These sources provided the content of the questions, as well as guidelines for the organization and layout. Items on the survey included both discrete quantifiable response options and open-ended responses. For the survey, a 5-point Likert-type scale was used for the majority of the questions.

The information used to develop the sections of the questionnaire came from the literature, which looked at industry trends. The items were grouped into three categories, the first being those trends which business professionals believe will most impact their organizations within the next ten year period ending in 2022, the second being the skills and knowledge that graphic communications professionals foresee as being the most important for their personnel to possess, and the third being demographic information about the reviewer filling out the survey.

More specifically, the five research questions are related to the survey questions as shown in Table 3.

Table 3. *Relationship between research questions and survey questions.*

Research Question	Survey Question and Item(s)
1. "What is your organization's forecasted level of involvement and implementation with computerization and automation of processes in the next 10 years?"	Question 1 items c, h, and i; question 2 items c, h, and i; and question 3.
2. "What is your organization's forecasted level of involvement and implementation with offering ancillary products and services in the next 10 years?"	Question 1 items a, b, d, e, f, g, j, k, and l; question 2 items a, b, d, e, f, g, j, k, and l; and question 3.
3. "What is the effect, if any, of a changing relationship between your organization and your customers in terms of achieving more of a partner or consultant status?"	Questions 19 and 20.
4. "What are the major technical skills that you predict will be needed by your personnel in the next 10 years?"	Questions 4 thru 9, items c and d; questions 10 through 18, and question 21 items b, d, i, and k thru z.
5. "What are the major soft or non-technical skills that you predict will be needed by your personnel in the next 10 years?"	Questions 4 thru 9, items a,b, and e; questions 10 through 16, and question 21 items a, c, e, f, g, h, and j.

Survey Questions 22-31 are for collecting demographic information. Survey Question 32 is for requesting the population for the qualitative phase of the study. This simply asks for those who would be willing to be contacted to include their name, phone number, and best days and/or times to call.

Development of the survey attempted to include only those questions and choices which were most relevant to the needs of the data collection. Rea and Parker (1997) suggest that researchers be sensitive to the length of the survey and the time and effort required to complete it. If it becomes too tedious for

participants, the response rate could be in serious jeopardy (Rea & Parker, 1997). Some questions were grouped or discarded if they were believed to be redundant or unnecessary.

Qualitative phase instrument development. For the telephone interviews, a list of guiding questions was used by a single interviewer. Initially these questions were going to be based on the survey results, asking the participants to comment on the findings. However, given that the response was small and the findings did not provide statistically significant results, these had to be modified. In addition, the experience of phoning nearly 300 companies asking them to take the survey provided additional insight. While talking to many of the owners and managers, it was revealed that open-ended questions were effective for eliciting responses. The script was revised to the information seen in Appendix C, and given IRB approval. The interview questions primarily served as a means of gaining more in-depth expansion and clarification of the information given in the online survey. Participants also used them as an opportunity to provide information above and beyond what was asked for in the survey. These results will be covered in Chapters 4 and 5.

Validation of the Quantitative Research Instrument (Survey)

A pilot survey was conducted to validate the design of the survey and determine reliability. The planned procedure for the pilot study was to ask participants to complete the questionnaire and give feedback on items such as ease of use, redundancy, explicitness, readability, understandability, and validity of the instrument. This feedback would have been used to modify the instrument

before it was submitted to the larger sample group. Unfortunately, none of the 12 participants originally invited to the survey responded.

The pilot participants were identified from a list of a National Print Owners Association, Inc. (NPOA). One member was contacted by phone and expressed enthusiasm for participating in the survey. He suggested contacting another member and provided his personal email address. That member gave a referral to the list manager. The request for permission to use the list to send out pilot survey invitations was declined. The member who had expressed interest was still included in the pilot invitation list.

The rest of the participants in the invitation list were located by Internet searches. It was intended to include a geographically diverse group of commercial printing owners and managers.

The members of the pilot group were invited with an email that included the text approved by the IRB and the link for the web address of the online survey. After one week and no responses, a reminder was sent via email to everyone in the group. After an additional five weeks, eight of these people were contacted by phone, and two received additional emails. Of those called, six were left messages and never replied; one gave an alternate email address and asked to be re-sent the invitation and agreed to respond, however, he did not; one declined to participate; one declined due to family matters but was willing to discuss the issues on the phone and provide anecdotal information.

Two months later, after no responses from the initial pilot group, one more industry person and an academic colleague were asked to participate. The

industry person responded within the same day and gave valuable feedback on the experience of completing the survey. In addition, his actual responses were thoughtful and interesting. The academic colleague was contacted repeatedly over a three week period but did not complete the survey or provide any feedback on its design.

It was decided that reasonable efforts had been made to get participants for the pilot study, and the process would proceed. Based on the industry professional's feedback, Question 2 was changed to be more clear to respondents. On the pilot survey, it read as "For each of these trends, would your future involvement represent an increase or decrease in involvement and/or implementation compared to what your company is currently offering:"

On the final survey, it read as "**Consider each of these trends again**. Would your future involvement represent an increase or decrease in interest or implementation compared to what your company is currently offering:"

The reviewer's comments were "I think I know what you are saying, but it is unclear and confusing."

By changing the first sentence to indicate that the participants were seeing the same list of trends as the previous question, it was hoped that they would be able to more quickly evaluate their responses, and realize that they were being asked to look at the same trends in a slightly different way.

The next issue that the industry professional raised regarded Question 8, pertaining to Management and Sales. On the pilot survey, it read as "For

employees in Management and Sales roles, please choose the level of importance for the items listed below."

The reviewer's comments were "To me Management and Sales are 2 different positions and would have different sets of answers."

Initially those groups had been put together to keep the survey from getting too long and therefore tedious for respondents. However, it was decided that for the sake of clarity, the small amount of length it added to the survey was worth it for better data. The areas of Management and Sales were divided into separate questions for both Question 8 and Question 14.

The final issue that the industry professional discussed was regarding Question 19. It reads, "The following topics are taught in many programs that prepare graduates to work in graphic communications, particularly printing and multimedia fields. Please indicate how important you believe each topic is in terms of including teaching it in the program. "

The reviewer's comments were "Important to me or important to them?"

It was decided not to make any changes to this question. Regarding the time it took to complete the survey, the reviewer said that it took him an hour with interruptions.

Procedures

Statement of Procedure

The procedure for this study consisted of two sequential phases, a quantitative data collection followed by a qualitative data collection phase. Both

phases required approval by University of Northern Iowa's Institutional Review Board (IRB).

Research Permission and Ethical Considerations

IRB approval. The nature of this project poses very minimal threat to the human subjects involved. However, to ensure protection of human subjects, confidentiality was maintained and permission for the study was obtained from the Institutional Review Board (IRB) at the University of Northern Iowa. In addition to gaining IRB approval, the researcher completed the online training in conducting the research involving human subjects.

Procedure for Quantitative Phase

The first phase included conducting an online survey with owners and managers of graphic communications organizations. The subjects were identified based on the process described earlier in this chapter with the Sample discussion. The pilot process was conducted as previously described in Instrumentation. After these were completed, the steps commenced for the main survey. A mailer was designed as an invitation to the survey, based on guidelines and recommendations from the IRB. Cost estimates were received from a local printing company. Images of the final design of the front and back of the mailer can be seen in Appendix F. Assistance on the design was received from the printing company, or service provider, who also performed the data merge for names and addresses, printed and mailed the invitations. This mailer was sent to the 301 people previously identified through the Sample discussion.

The second invitation, a postcard, was designed to have visual elements consistent with the first mailer, although less information overall. Before the second invitation was mailed, the printing company reviewed the tracking information to make sure that recipients would have received the first mailer. The postcard was sent out to the same mailing list four days after the initial mailer. Only one postcard was returned as undeliverable. The rest had no indication of not being successfully sent. Images of the final design of the front and back of the postcard can be seen in Appendix G.

The invitations mailed out resulted in five responses to the survey. Two of these volunteered to be called for the phone interviews to collect data for the qualitative phase. Due to the low number of responses, it was decided to extend the deadline on the survey. In addition, an incentive was added in the form of a drawing for a $50 Amazon gift card. In order to improve response rates, nearly all of the people in the sample group were called directly and asked to please fill out the survey. There were 23 people who were emailed without calling because those email addresses were available. The remaining 278 were phoned over the course of 2 weeks.

Of those 278 called, they fell into the following categories:

1. Contact was made with the owner directly in the initial phone call.
2. My phone call was transferred to a different person within the organization, i.e. in Human Resources or manager in pre-press
3. Someone in the organization, i.e. receptionist, took a message and said they would get it to the appropriate person.

4. I reached a voicemail system and a left detailed message with an explanation of the study, as well as my phone number or email address.
5. The person reached stated that it was against company policy to participate in any surveys.
6. The receptionist provided the name and email of a person who would be best suited for completing the survey.
7. One person offered to discuss the topic and answer any questions, but was too busy to actually complete the survey. His responses were written down for anecdotal data.

Following the phone calls, many of those who received voicemail messages then emailed me agreeing to do the survey and asking for the online link. The link was provided right away, the same day in most cases.

The final result was 51 respondents to the survey, 42 of whom completed all 32 of the questions. This represents a 17% return rate.

Procedure for Qualitative Phase

Personal phone interviews were conducted with volunteers from participants who responded to the survey. To collect the sample group for the phone interviews, Question 32 on the survey allowed respondents to indicate their willingness to be contacted, as well as the best method and date/time to be contacted.

The script was created for the interviews based on the literature review, information collected in the survey, and talking with industry professionals. The script was approved by the IRB. The script can be found in Appendix C.

Prior to making the phone calls for interviews, research was conducted on applications for recording phone calls. After several applications were reviewed and two downloaded, Automatic Call Recorder, an Android app, was chosen to use. Testing was necessary to determine the correct process and set-up methods, for both recording and storing the audio files. In addition, the files were uploaded to a computer and Google Drive for backup and playback ability.

Data Analysis

Descriptive statistics were used to analyze most of the data, such as the demographic information for the sample. In some cases, it was possible to use basic inferential statistics as well. The specifics will be discussed in Chapter 4.

For all of the research questions, the population means and standard deviations were calculated for the quantitative data from the survey. In addition, the qualitative data from the survey questions were coded and analyzed. All Likert-type scales were set up with the continuum going weakest to strongest agreement, from the left end to the right end. There was one exception. Survey Question 2 was set up incorrectly in the opposite direction. However, this was compensated for and calculated correctly.

For Research Questions 4 and 5, the corresponding data came from survey questions 4 through 19. The population means were also computed. However,

the comparisons were between the items in each survey question, due to the fact that the ranking of the items was most important.

Sample Size Analysis

Using the open source software gpower, it was determined that a useful sample size would be 80 responses, although better would be 180. There is a concern for the lack of ability to determine statistical significance in some areas. Also, there is a concern of sample bias due to the large number of non-respondents. These issues will be addressed in Chapters 4 and 5.

Data Analysis for Telephone Interviews

The recordings from the interviews were transcribed for analysis. A method known as Framework Analysis was used to interpret the data. Framework Analysis for qualitative data was first described by Erving Goffman in 1974 (Koenig, 2013). This method has been further refined and modified by many researchers since then. The variation of Framework Analysis used in this study was developed by Matt Barnard of the National Centre for Social Research (Barnard, 2010).

Barnard described the process as having two parts: (1) data management, and (2) data analysis. The first objective is to take the transcribed conversations and restructure them into usable discourse, a process he refers to as "chunking." The second priority is to reduce the volume and prioritize the ideas, thereby creating a map of the data. Barnard (2010) recommends using a matrix as a visual organization tool. Themes are deduced from the contents of the case studies. In this study, that would be the individual phone interviews. The overall amount

of data to process is reduced through summarization and synthesis into a hierarchy of themes and sub-themes (Barnard, 2010). The results of this process will be discussed in Chapter 4 along with the interpretation of the phone interviews.

CHAPTER 4

RESULTS

The data collected to identify industry changes and resulting competency needs in Graphic Communications were compiled and analyzed to determine implications for curriculum development in secondary, post-secondary, and corporate training settings. Data collection methods included a survey and phone interviews, which produced both quantitative and qualitative data. The results of the data analysis were used to answer the Research Questions that form the basis of the study. Statistical methods included descriptive statistics, inferential statistics, and coding and framework analysis for qualitative data. Each method will be discussed with the results to which it pertains. For example, descriptive statistics were used better to understand the demographic information on the sample group.

Data Analysis

This chapter begins with a description of the sample that was used, followed by a presentation of the results from both the quantitative and open-ended survey questions. The results of the phone interviews follow in a discussion of the results from the qualitative phase of the research.

Discussion of Sample Characteristics

The number of respondents who participated in this survey represented 17% of the sample group. Out of 301 commercial printers contacted throughout the U.S., there were 51 who participated, and 42 who completely filled out the survey. Many of those who had started and abandoned the survey appeared to

do so at the same point, Question 4, "Administrative Personnel: For employees in Administrative roles, please choose the level of importance for the items listed below." A discussion of this will follow with the reporting of the results for that survey question. Due to the overall low number of completions, there are limits to being able to generalize the results to the larger population of commercial printers throughout the U.S. A discussion of potential reasons why the response rate was so low, as well as recommendations for improvement in future surveys, can be found in Chapter 5. The data that were collected in the survey and phone interviews will be presented in this chapter as well.

Demographics on Sample Respondents

On the survey instrument, the questions that collected data on the demographics of the sample respondents were Questions 22 through 31. Following is a reporting of that data.

Overall, the respondents can be characterized as primarily males who are Owners, Co-Owners, or managers of their organizations. They tend to be 50 years of age and older. They have many years of experience in the industry, with most having 31-40 years. These findings are not only consistent with industry information, they are favorable for the results of the study. These categories of respondents are well suited for discussing industry trends and making predictions. They have weathered many changes and managed to be successful.

For the 42 respondents who answered the question "What is your gender," there were six who indicated female and 36 who indicated male, representing 14.3% and 85.7% respectively. Nine people did not answer the

question. While a more diverse sample group would be preferable, the predominance of males in the company leadership positions is also consistent with industry information.

In terms of job position, 42 respondents answered Question 25, "What is the job title for your current position?" Nine people skipped the question. The majority of responses were Owner, Co-owner, or President. The other four responses categorized as "Other" were CFO, Director Corporate Prepress, Chief Operating Officer, and Operations Manager. The frequencies and percentages can be seen in Table 4 and Figure 5.

Table 4. *Respondent's selected job title.*

	f	%
Owner/Co-owner/President	26	62%
Manager	6	14%
Other (please specify)	4	10%
Vice President	3	7%
Human Resources	2	5%
Production	1	2%
Other	4	10%

Note. *n*=42

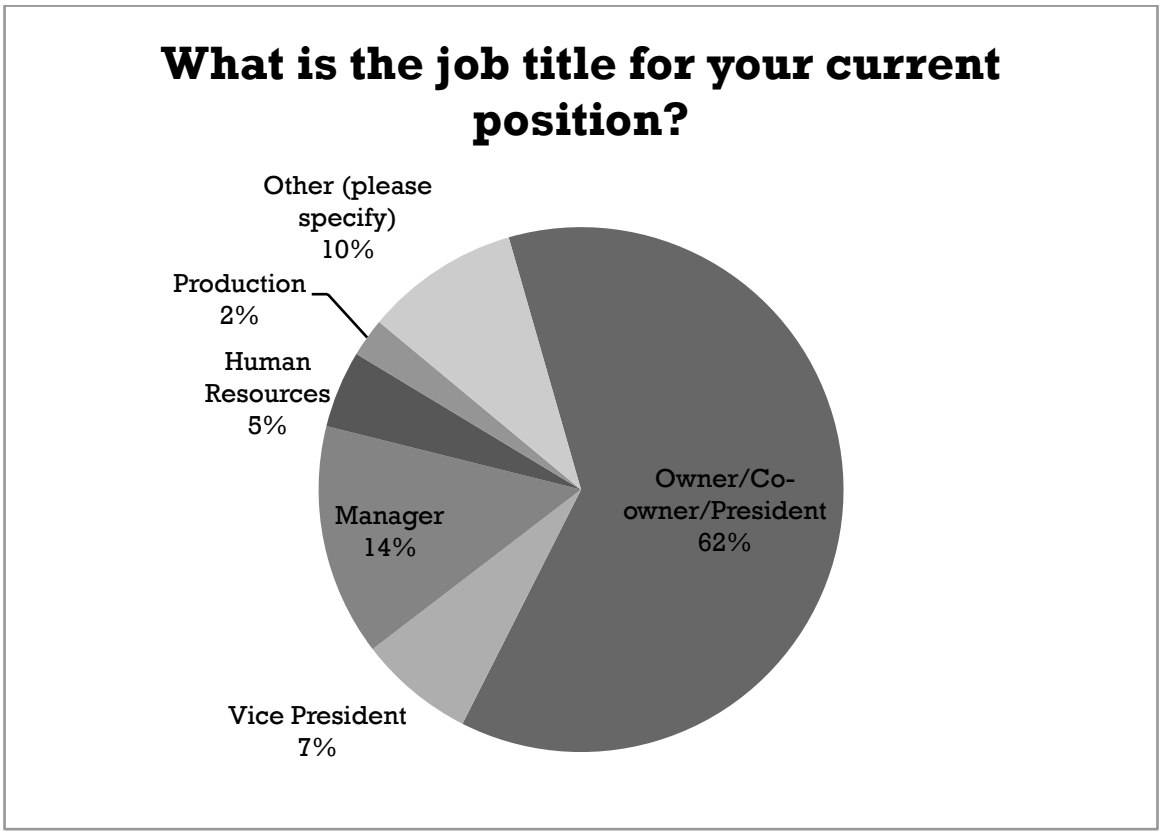

Figure 5. Job title of respondents.

Regarding the age of the respondents, 42 answered Question 22, "The person who filled out this survey is in the following age range," and nine people skipped it. The majority of respondents were 50 years of age or older. The results can be seen in Table 5, which is sorted by largest to smallest. While it could be argued that the age of the respondents suggest a lack of comfort with newer technology, the comments entered in the open-ended questions, as well as information gained in the telephone interviews, contradict this idea. The fact that respondents had weathered many changes and adapted numerous times seemed to indicate that their age did indeed bring some wisdom.

Table 5. *The age range of the respondent.*

Age Range	*f*	%
50-59	16	38%
60+	12	29%
40-49	7	17%
30-39	5	12%
22-29	2	5%
18-21	0	0%

Note. *n*=42

The results can also be seen graphically in Figure 6. In both cases, it can be seen that the respondents were generally older than entry-level positions.

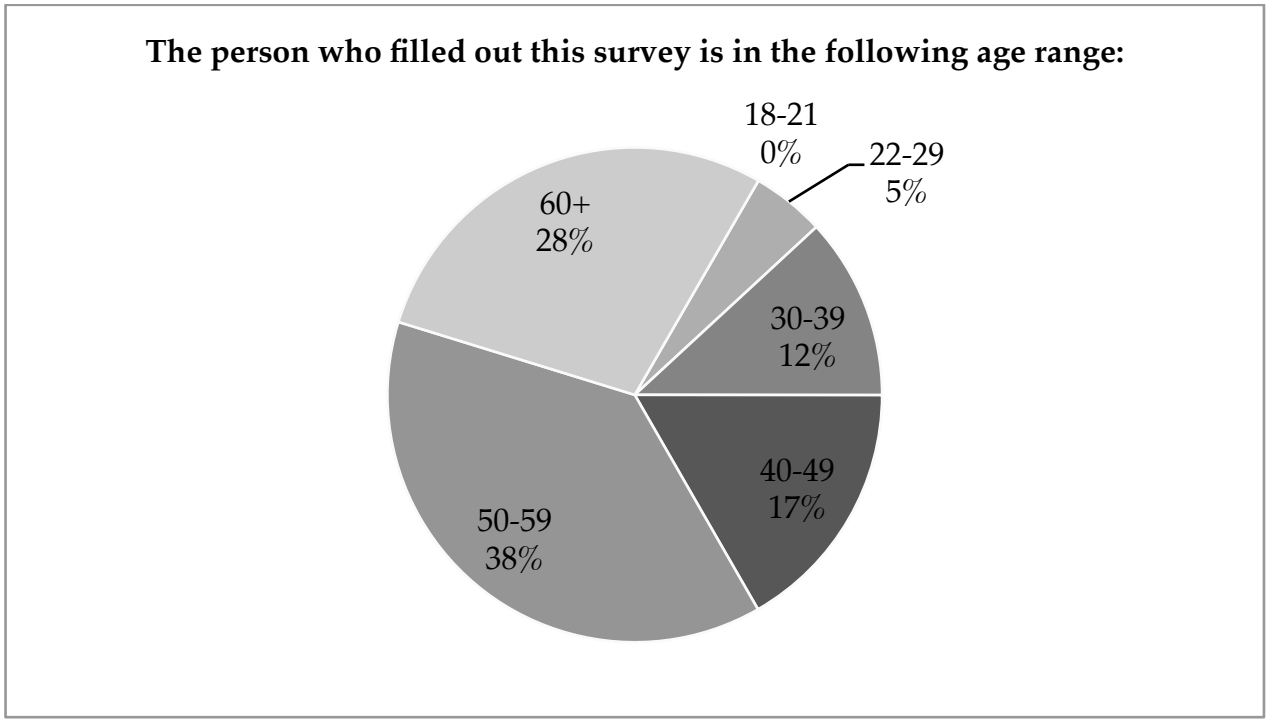

Figure 6. Percentages of results from Survey Question 22, age groups of respondents.

For the question "How many years have you been in the graphic communications industry?" 41 answered it, and nine skipped it. Their years in the graphics communications industry ranged from zero to 40+, as seen in Table 6 and Figure 7.

Table 6. *Respondent's years in industry.*

Yrs. in Industry	*f*[a]	%
0-5	2	4.9%
6-10	2	4.9%
11-20	3	7.3%
20-30	11	26.8%
31-40	14	34.1%
40+	9	22.0%

Note. *n*=41

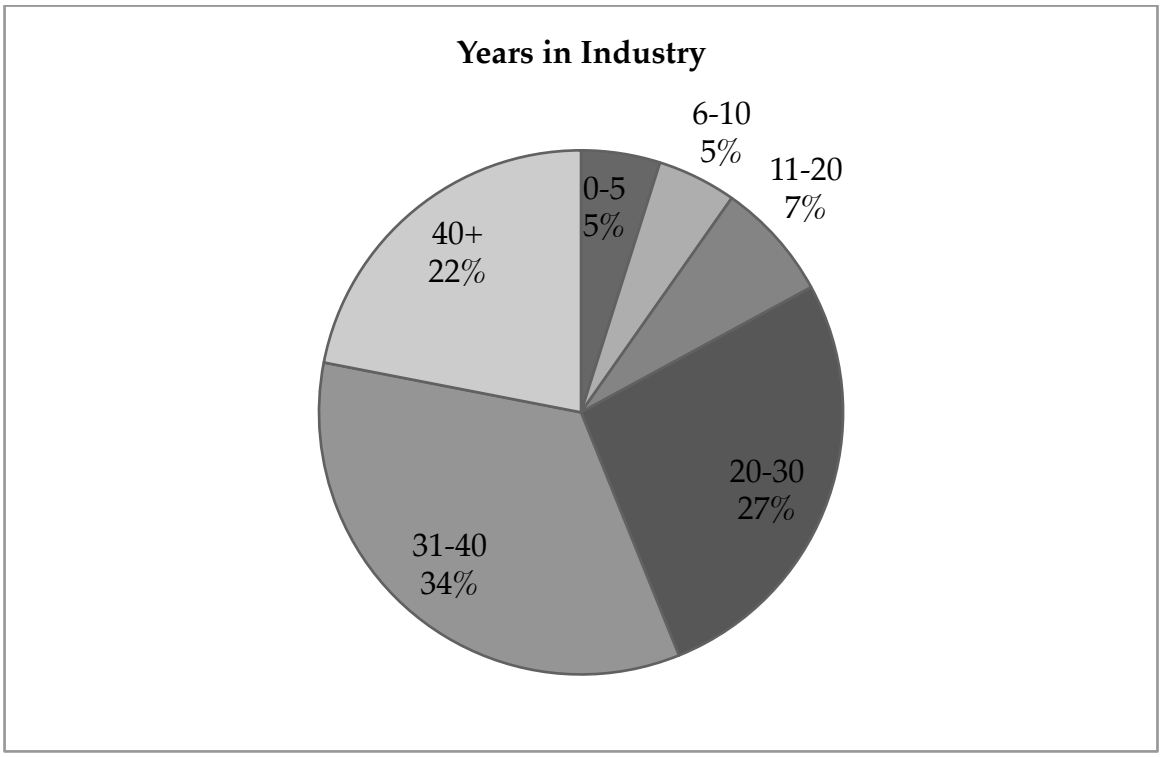

Figure 7. Respondent's years in industry.

Demographics on Respondents' Organizations

The companies' time in business ranged from four to 105 years. They were founded in the years from 1908 to 2009, as shown in Figure 8. The companies were located in states across the U.S. from New York to California, as seen in Figure 8. To better understand how this relates to the state dispersal sought for respondents, Table 7 compares the desired vs. actual states of origin.

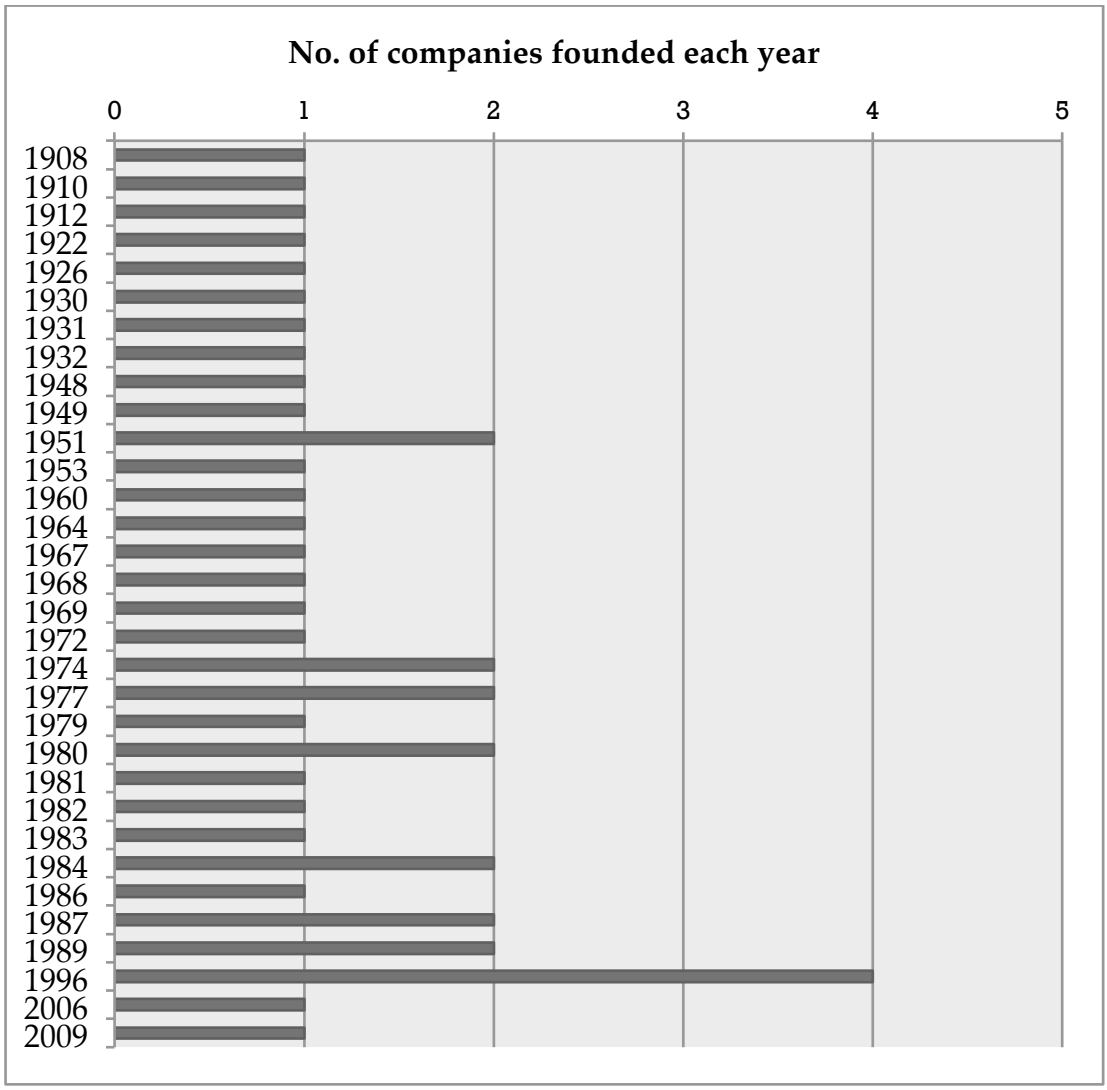

Figure 8. Number of commercial printing organizations founded by year.

As Table 7 also shows, there were 22 states that represented where the respondents' organizations are located, out of the 52 total U.S. states invited. The states which did not have a representative were Alaska, Arkansas, Arizona, District of Columbia, Delaware, Hawaii, Iowa, Indiana, Kentucky, Missouri, Mississippi, Montana, North Dakota, Nebraska, New Hampshire, New Jersey,

New Mexico, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, Vermont, Washington, West Virginia, and Wyoming.

Table 7. *States in which the respondents' organizations are located.*

State	*Number replied*	*Number contacted*
AL	1	1
CA	8	50
CT	1	5
FL	1	11
GA	2	6
ID	1	1
IL	1	17
KS	1	3
LA	1	2
MA	1	9
MD	1	6
ME	1	1
MI	2	9
MN	1	7
NC	3	6
NV	1	1
NY	4	23
OH	2	15
OK	1	3
PA	2	16
TX	2	16
WI	2	7
Totals	40	215

Regarding the question "How many full-time employees currently work for your organization?" the size of the organizations varied from between one to ten full time employees, to 151-200. The specific replies can be seen in Table 8.

These numbers and percentages are representative of industry estimates for size of organization based on number of employees.

Table 8. *Number of employees who work in the respondent's organization.*

# of Full time employees	*f*	%
1-10	8	19%
76-100	7	17%
101-150	7	17%
200+	7	17%
51-75	6	14%
31-50	4	10%
11-30	1	2%
151-200	1	2%
Other (670)	1	2%

The respondents self-identified their companies as being primarily involved with the following industry sectors: Commercial printer/Sheetfed (60%), Digital Printing (20%), and Mailing and Fulfillment (20%). None of the respondents chose the following: Forms Printing, Finishing Services, Book Printing, Greeting Cards, Indoor/Outdoor Signage, Packaging, Promotional Products, Web Press Printing, or Other (Please specify). This finding is not surprising considering that the sample group was chosen to be primarily commercial printers. The range of other services indicated in this survey question and the following, with the data shown in Tables 9 and 10, indicate the

way in which commercial printers are extending their range of products and services, consistent with the literature.

Table 9. *Primary business services offered.*

	f	%
Commercial printer/Sheetfed	25	57%
Web Press Printing	5	11%
Other (please specify)	5	11%
Packaging	4	9%
Digital Printing	3	7%
Mailing and Fulfillment	2	5%
Forms Printing	0	0%
Finishing Services	0	0%
Book Printing	0	0%
Greeting Cards	0	0%
Indoor/Outdoor Signage	0	0%
Promotional Products	0	0%

Note. n=44

For the question "What other services does your company provide? Choose all that apply." 42 responded and nine did not answer. The main results can be seen in Table 10. For Other, the three responses were: (1) Creative services, Special programming related to variable data marketing, (2) Envelopes, and (3) Grand imaging (wide format display).

These data are not surprising, considering that the organizations invited to participate in the study were identified as primarily being commercial printers, prior to inclusion. In addition, the current literature shows that most

companies currently do or will soon be offering many additional types of services. Discussion of this phenomenon and how it will affect future personnel will be included in Chapter 5.

Table 10. *All other services offered by companies.*

Types of services	*f*	%
Digital Printing	39	95.1%
Mailing and Fulfillment	39	95.1%
Finishing Services	34	82.9%
Commercial printer/Sheetfed	27	65.9%
Indoor/Outdoor Signage	24	58.5%
Packaging	18	43.9%
Book Printing	16	39.0%
Promotional Products	16	39.0%
Forms Printing	15	36.6%
Greeting Cards	12	29.3%
Web Press Printing	11	26.8%
Other (please specify)	3	1%

Note. n=42

Summary of Demographic Data

The overall characteristics of the sample group are a mature age group, experienced, and with higher levels of responsibility within their organizations, which tend to be small. They are primarily commercial printers, although they do offer a good range of additional services as well. This group of respondents is typical of the industry, and given that they are decision makers and have history

with the industry, the respondents are also in a good position to give helpful responses for this study.

The other aspect of the sample that needs to be discussed is the small number of respondents. This does call into question sample bias. It is impossible to say if the non-respondents would have given similar responses to the survey and phone interviews or not. However, the data has been analyzed and interpreted nonetheless. Recommendations for improving the sample size in replications of this study are provided in Chapter 5.

Non-Demographic Survey Results

The presentation for the results of the non-demographic areas of the survey will be organized around the Research Questions. These are based on the overall research question, "What impact will technical and business process trends in the graphic communications industry have on the required competencies of its future personnel?" The individual research questions will now be addressed, utilizing both structured and open-ended questions from the survey. This will be followed by a discussion of the qualitative data collected during the telephone interviews.

Automation and Computerization

Research Question 1 was, "What is your organization's forecasted level of involvement and implementation with computerization and automation of processes in the next 10 years?" On the survey, Questions 1, 2, and 3, ask for data pertaining to this research question. Question 3 is open-ended; the rest of the survey questions utilize a Likert-type scale. For calculation purposes, the choices

for Question 1 were scored as follows: No interest, involvement or implementation=1, Interested and researching=2, Not sure=3, Some degree of implementation=4, Heavy involvement or implementation=5. The other two scales will be explained with the presentation of the data from those questions.

Survey Question 1 was "What do you project your company's involvement or implementation to be within the next 10 years regarding:" followed by a list of possible trends as suggested by the literature review in this paper. These were the trends listed:

a. Creating web sites for your customers
b. Providing Web to Print services
c. Using MIS and computerization for job orders, job tracking, invoicing, etc.
d. Providing Fulfillment services for your customers
e. Offering pad printing services, such as for promotional products
f. Using PURLs and/or other types of personalized web addresses for your customers
g. Offering Variable Data Printing or Variable Data Marketing services
h. Using automated workflow solutions such as Prinergy, Rampage, etc.
i. Automating your workflow using Job Definition Format (JDF)
j. Offering dye sublimation printing services
k. Providing output to ebooks, iPad/tablet, or other mobile formats
l. Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital

The question was answered by all 51 of the participants. The items in Survey Question 1 that relate to Research Question 1 are c, h, and i. The mean

scores and standard deviations for those items are reported in Table 11. The data results for the rest of the items will be addressed in the discussion concerning Research Question 2.

Table 11. *Population means and standard deviations for forecasted trends relating to automation and computerization in graphic communications.*

Survey Question 1	M	SD	t	p	Sig?
c. Using MIS and computerization for job orders, job tracking, invoicing, etc.	4.71	.83	14.65	.000	Y
h. Using automated workflow solutions such as Prinergy, Rampage, etc.	4.43	1.17	8.16	.000	Y
i. Automating your workflow using Job Definition Format (JDF)	3.41	1.51	3.49	.001	Y

Note. n=51; df=50; $p < .05$, two-tailed

Based on the scoring of the neutral option, "Not sure" = 3, the results are fairly strong to indicate that these trends will be implemented from "some degree" to "heavy." The p-values support the statistical significance of the results as well.

Survey Question 2 was "Consider each of these trends again. Would your future involvement represent an increase or decrease in interest or implementation compared to what your company is currently offering:" For scoring purposes, the options are: Decrease significantly=1, Decrease somewhat=2, Stay the same=3, Increase somewhat=4, and Increase significantly=5. The choice "Not applicable" was treated as a non-item and set aside.

Table 12. *Population means and standard deviations for forecasted degree of change for trends relating to automation and computerization in graphic communications.*

Survey Question 2	M	SD	t	p	Sig?
c. Using MIS and computerization for job orders, job tracking, invoicing, etc.	4.14	0.83	7.50	.000	Y
h. Using automated workflow solutions such as Prinergy, Rampage, etc.	3.93	0.86	1.36	.179	N
i. Automating your workflow using Job Definition Format (JDF)	3.88	0.80	0.84	.403	N

Note. n=51; df=50; $p < .05$, two-tailed

The purpose of Question 2 was to provide support for and further understand the data from Question 1. The options for trends are the same ones listed previously for Survey Question 1. The means and standard deviations for each item are shown in Table 12. Given that the midpoint would be "Stay the same," which is scored as a three, all of the items' means signify at least some increase for interest and implementation of the listed trends. However, h. and i. do not indicate a statistical significance. This could be due to the fact that there was almost an even split in responses between "Stay the same," "Increase somewhat," and "Increase significantly." The overall implication is that all of the technology trends will continue to some extent for a majority of the companies.

Comparison of Questions 1 and 2. When looking at the results of Survey Questions 1 and 2 side by side, agreement can be seen between the forecasted trends and the degree to which implementing them will increase or decrease. The results are seen in Table 13, which was sorted largest to smallest by population means for Survey Question 1.

The noteworthy aspect of this data is that it shows both an interest in the trends listed, as well as an increase in the implementation of those trends. This is the type of relationship that provides support for the strength of these trends.

Table 13. *Comparison of trend forecasting and level of increase or decrease.*

	Question 1 M	Question 2 M
c. Using MIS and computerization for job orders, job tracking, invoicing, etc.	4.71	4.14
h. Using automated workflow solutions such as Prinergy, Rampage, etc.	4.43	3.93
i. Automating your workflow using Job Definition Format (JDF)	3.41	3.88

Note. n=51

Survey Question 3 provided a chance for respondents to add any additional ideas they had on the upcoming trends in graphic communications. The question read, "Do you have any other thoughts or predictions on how upcoming trends in the Graphic Communications industry will change how you do business?" After the data were collected, they were coded into categories. Those categories were separated individually to apply them to the Research Questions. The first items from Survey Question 3 to be presented, in Table 14, are those that relate to automation and computerization.

Table 14. *Respondent's ideas on trends that will impact the future of the graphic communications industry from Survey Question 3.*

Trend	*f*
Storefront approach or turnkey solutions will be developed, sold, and maintained.	1
Continue to remove human touch points.	1
Rise in APIs	1
Traditional jobs changing to more MIS	1

Note. n=14

Unfortunately the results were given more as a list and not a clear description of the effects that respondents believe these items will have on the future of graphic communications. What can be surmised overall from the items in Table 14 are that computerization and automation will be present in various forms, such as electronic storefronts where customers can go to place their own orders, thereby reducing the amount of interaction between customers and commercial printing employees. This can only be done with a more automated and systematic approach to the products that customers would purchase. In addition, the statement "Continue to remove human touch points" also indicates an increase in automation. The statement "Traditional jobs changing to more MIS [Management Information Systems] indicates the increased influence of computerization in the industry. Finally, the statement "Rise in APIs [Application Programming Interface] suggests that computer programming will have a direct influence on the industry as well.

Summary of automation and computerization. When considering all three of the survey questions together, there are indications that automation and

computerization of the workflow is projected to be increasing in commercial printing. This could take a variety of forms, such as less human touch points both internally and externally with customers, processes internally that depend more on computerization, and processes between the commercial printer and their customer that are more automated, such as placing orders on an Internet based system.

Ancillary Services

Research Question 2, "What is your organization's forecasted level of involvement and implementation with offering ancillary products and services in the next 10 years?" also relates to Survey Questions 1, 2, and 3. However, the individual items from each question are different than those that relate to Research Question 1. The items from Survey Question 1 relating to providing ancillary services and products within the Graphic Communications field are shown in Table 15. Considering that the core of a commercial printer's business has been "putting ink on paper," ancillary products and services are those which move into services and products beyond that scope.

Table 15. *Population means and standard deviations for forecasted trends relating to providing ancillary products and services in graphic communications*

Survey Question 1	M	S	t	p	Sig?
g. Offering Variable Data Printing or Variable Data Marketing services	4.45	1.17	8.84	.000	Y
d. Providing Fulfillment services for your customers	4.25	1.34	6.69	.000	Y
b. Providing Web to Print services	4.16	1.45	5.71	.000	Y
f. Using PURLs and/or other types of personalized web addresses for your customers	3.55	1.46	2.68	.010	Y
a. Creating web sites for your customers	3.37	1.66	1.60	.115	N
l. Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital	3.02	1.49	0.09	.925	N
e. Offering pad printing services, such as for promotional products	2.84	1.68	-0.67	.507	N
k. Providing output to ebooks, iPad/tablet, or other mobile formats	2.24	1.35	-4.04	.000	Y
j. Offering dye sublimation printing services	2.06	1.33	-5.19	.000	Y

Note. n=51; df=50; $p < .05$, two-tailed

Consistent with the literature (Davis, 2009b), variable data printing is projected by the respondents to be an important trend in the future of commercial printing. As noted previously, three is the midpoint for the scale in Survey Question 1 and refers to the neutral position or "Not sure." Therefore, the top six means are consistent with "Some degree of implementation" or "Heavy involvement or implementation." What is surprising is that the mean was not higher for "k. Providing output to ebooks, iPad/tablet, or other mobile formats," This topic is found in the literature and predicted to increase in importance and use.

The statistical significance was not proven for three of the items in Table 15, including “e. Offering pad printing services, such as for promotional products.” This is not too surprising since pad printing is often considered a specialty service and not typically one that is offered by commercial printers. The same can be said for “a. Creating web sites for your customers.” That service has typically been relegated to companies that are outside the bounds of a commercial printer. The third item without proven statistical significance was “l. Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital.” However, given a 95% confidence level, item l has a computed lower level of 2.91 and upper level of 3.84. Therefore if this study were to be conducted again, the average of the results would most likely fall in that range.

Along with the forecasting of interest and implementation regarding ancillary products and services, respondents also indicated whether their involvement would mean an increase, decrease, or no change from their current offerings. In Table 16, there is a clear indication that the involvement will increase at least somewhat, and more likely increase significantly. In fact, all of the means are above three, which is the midpoint for neutral or “Stay the same” in Survey Question 2, as previously discussed.

Table 16. *Population means and standard deviations for forecasted degree of change for trends relating to providing ancillary products and services in graphic communications.*

Survey Question 2	M	SD	t	p	Sig?
b. Providing Web to Print services	4.38	0.75	9.57	.000	Y
g. Offering Variable Data Printing or Variable Data Marketing services	4.32	0.79	8.90	.000	Y
a. Creating web sites for your customers	4.19	0.76	2.24	.030	Y
d. Providing Fulfillment services for your customers	4.09	0.83	4.00	.000	Y
l. Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital	4.02	0.81	1.31	.197	N
f. Using PURLs and/or other types of personalized web addresses for your customers	3.93	0.87	0.99	.329	N
k. Providing output to ebooks, iPad/tablet, or other mobile formats	3.89	0.88	-0.66	.511	N
j. Offering dye sublimation printing services	3.59	0.84	-4.10	.000	Y
e. Offering pad printing services, such as for promotional products	3.52	0.77	-3.36	.001	Y

Note. n=51; df=50; $p < .05$, two-tailed

All but three of the items in Table 16 were shown to have statistical significance in their results. Two of those without statistical significance were the same as in Table 15: "l. Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital," and "k. Providing output to ebooks, iPad/tablet, or other mobile formats." However, with a 95% confidence level, item l has a computed lower level of

The third item without statistical significance was "f. Using PURLs and/or other types of personalized web addresses for your customers." This

could be due to the fact that for those organizations already offering this service, they do not foresee an increase in the trend.

Survey Question 3 also has some results that relate to the offering of ancillary products and services. Respondents indicated some specific trends, in addition to those listed in Survey Questions 1 and 2, which will have an impact on the future of graphic communications. For example, there is new technology that could change production processes, business processes, and therefore workflow processes as well. The results can be seen in Table 17.

Table 17. *Respondent's ideas on trends that will impact the future of the graphic communications industry from Survey Question 3.*

Trend	*f*
Adaptability, Diversification, and Ancillary services are needed for success	3
New technology, such as Artificial Intelligence and the Landa Printing Press will have a dramatic impact	3
Smartphone applications and content will affect print solutions.	2
Storefront approach or turnkey solutions will be developed, sold, and maintained.	1
Specialized printing, such as U.V. and packaging, will increase.	1

Note. n=14

Respondent's additional thoughts on trends. The remaining items from Survey Question 3 (those not covered with Automation or Ancillary Product and Services) are either addressing different issues, or in some cases too vague to categorize. These statements are listed in Table 18.

Table 18. *Respondent's ideas on trends that will impact the future of the graphic communications industry.*

Trend	*f*
Digital printing will increase and have a large influence on the industry	5
The number of printing companies will decline.	1
Traditional static printing will change to versioned printing.	1
Become partners with customers.	1
Sustainability will rise	1

Note. n=14

The results gathered from this question were more of a listing of technologies and trends, versus a discussion of how the respondents' businesses would actually be impacted. In some cases, they merely stated that these items could have an impact. For example, the statement "The acceptance of Augmented Reality applications could have a major impact" indicates what the specific technology is, but not how it will change the way in which commercial printers do business. Another statement, "Anything that can go digital, will go digital quickly. Anything that can't go digital right now will go digital eventually." indicates the direction that technology and workflows are headed. While no specifics are given in terms of how this will affect business services and processes, some inferences can be made when considering that statement in conjunction with the rest of the results and information from the literature. Given that one purpose of this study was to determine those topics to focus on in a graphic communications curriculum, this would lead one to conclude that digital versus manual or analog processes are preferred. One statement which seems to

summarize the overall sentiment is “YOU WILL HAVE TO KEEP UP WITH THE TRENDS AND DIVERSIFICATION TO STAY IN BUSINESS.”

Relationship Between Printers and Customers

After considering the technological and business trends in graphic communications, it’s important to look into the trends regarding the organizations and their relationships with their customers. According to the literature, this will also be changing in various ways. For this study, Research Question 3, “What is the effect, if any, of a changing relationship between your organization and your customers in terms of achieving more of a partner or consultant status?” relates to Survey Questions 19 and 20.

Question 19 was “Consider the relationships between your organization and your customers, and how you predict those to be in the next 10 years. With that in mind, please indicate to what extent you agree or disagree with the following statements:”. The choices were given in a Likert-style scale and scored as follows: Strongly disagree=1, Somewhat disagree=2, Not sure=3, Somewhat agree=4, and Strongly agree=5. Forty-three people responded and eight people did not answer the question. The results can be seen in Table 19.

Table 19. *Frequency of respondent's forecasts on characteristics of relationships with customers.*

	M	SD	t	p	Sig?
In addition to providing bids, the service/print provider will be brought into the marketing process much earlier. They will be considered more of a consultant or partner with their customers, in the role of solving and understanding the needs of their customers.	4.53	0.83	12.18	0.000	Y
With the continued reliance on customer databases for variable data marketing, trust and loyalty will be increasingly important between service/print providers and their customers.	4.53	0.83	6.59	0.000	Y
Salespeople in the service/print provider organizations will be given access to personnel higher up in the customer organization, often those with more authority for making decisions.	4.09	1.09	12.18	0.000	Y

Note. n=43; df=42; $p < .05$, two-tailed

The results in Table 19 indicate that there is strong agreement with the statements listed in Survey Question 19. This is consistent with the trends found in the literature review. Not only are the means high, the statistical significance is proven with very low p values.

For the open-ended survey Question 20, "How would you describe the relationship that you envision between your organization and your customers over the next 10 years? What changes might take place?" the responses given were coded and the summarized statements and frequencies can be found in Table 20. The complete statements can be found in Appendix E.

Table 20. *Participants' responses regarding the nature of the relationship between service provider (commercial printer) and customer.*

	f
More of a partner relationship	9
Sales approach needs to improve	5
Customers will still be driven by cost considerations	3
Need to offer online ordering solutions	3
Need to practice flexibility and adaptability	2
Not commodity; need to be value-added, not just price-based	2
Printers will take control of DAM, including multimedia	1
Need to be involved with the customers at the planning stage	1
Have to earn the customers' trust	1
Need good communication	1
Less personal involvement with customer	1
More contact and better understanding of customers' business	1

Note. n=21

A great deal of information is present in the statements provided by the respondents. While overall there seems to be agreement that a partner status is needed for successful business operations, there are various methods and strategies for accomplishing this. One respondent's statement shows the extent to which they are integrated into their customer's business: "We are a ' partner ' with our clients to the point of blending with them on concepts to finish projects. We are there from start to finish and beyond, we are almost a part of their staff to a point."

Out of the 21 people who responded, five agreed that a change in the sales approach is necessary. The specifics of this can be seen in the following two statements, which do present somewhat conflicting ideas: (1) "Sales people must

be more competent and offer value added solutions rather than just estimates," and (2) "I don't know that things will change that much between providers and customers. Where salespeople are generally the first line of communication between the two, I think that for the most part the general annoyance and need-to-work-with attitude towards salespeople will remain largely unchanged - if not more strained due to seemingly more aggressive tactics in use."

There is a comprehensive statement given by one of the respondents that coincides with the competencies preferred, such as communication. It is:

> More transparency, more communication and growing business relationships/partnerships. The industry is going through some growing pains with the economy and emergence of the digital age. Flexibility and adaptability are important and clarity in communication will be especially important to keep all involved parties supported through change so organizations and the individuals running them don't seize up.

The results of Questions 19 and 20 are consistent with the literature which indicates that service providers and their customers will need to have more of a partnership type relationship. In the past, customers could simply go to different printing companies for a quote on a job and choose the lowest price. That is no longer sufficient for either the customer or the provider. The technology is more complex, as is the processes required to produce the items and services that graphic communications customers need.

Technical and Soft Skills Required

In addition to trends affecting technology and business processes, and the changing relationships between commercial printers and their customers, this study sought to gain information on the required technical and soft skills that

business owners and managers believe will be necessary for their employees in the next ten years.

Technical skills. Research Question 4 was "What are the major technical skills that you predict will be needed by your personnel in the next 10 years? " In order to address this question, some of the items in Survey Question 21 will be used. That question was, "The following topics are taught in many programs that prepare graduates to work in graphic communications, particularly printing and multimedia fields. Please indicate how important you believe each topic is in terms of including teaching it in the program." The question used a Likert-type scale, with the options being: Not important=1, Somewhat important=2, Important=3, Extremely important=4. The midpoint used was 2.5. The results can be seen in Table 21.

The means in Table 21 indicate less agreement on the importance of the items listed. Only one item, "u. Variable data marketing," was above a three for "Important." With the midpoint at 2.5, there is an indication that these topics do have some importance to include in a graphic communications curriculum, however the means alone are only significant for seven of the items. While most of the means were close to or above the midpoint, 10 out of the 17 items do not have proven statistical significance. This data indicates much more of a mixed result, with more difficulty in being able to generalize the results.

Importance of technical skills and competencies on a scale of one to four.

Survey Question 21	M	SD	t	p	Sig?
u. Variable data marketing	3.16	0.84	5.15	.000	Y
s. Spot color and process builds	2.86	0.83	2.84	.007	Y
v. PURLs, QR codes, and email blasts	2.84	1.00	2.21	.032	Y
i. Quality control systems & devices	2.79	0.64	2.99	.005	Y
b. Job estimating, planning, & scheduling	2.72	0.77	1.89	.066	N
p. Binding – understand the terminology & processes that are used	2.72	0.63	2.30	.026	Y
t. Printing industry standards such as SWOP, GRACoL and G7	2.72	0.73	1.97	.055	N
d. Plant organization, management and workflow	2.71	0.67	2.06	.045	Y
n. Understanding the concept of Imposition	2.71	0.77	1.79	.080	N
r. Color management	2.70	0.80	1.61	.114	N
w. Content management and re-purposing	2.67	0.84	1.37	.179	N
q. Product fulfillment– understand logistics and physical distribution	2.64	0.66	1.41	.166	N
x. Social media marketing	2.58	0.96	0.56	.580	N
z. Publishing for mobile devices	2.56	1.01	0.38	.707	N
o. Being able to perform Imposition with software programs	2.49	0.77	-0.10	.921	N
y. Interactive pdfs	2.49	0.86	-0.09	.929	N
m. Computer programming	2.21	0.86	-2.21	.032	Y

Note. n=43; df=42 for all except d, n, and q; $p < .05$, two-tailed

Soft skills. Research Question 5 was "What are the major soft or non-technical skills that you predict will be needed by your personnel in the next 10 years?" In order to answer this question, Survey Question 21 included items

characterized by both technical and soft skills. In Table 22 the relative importance of each, as indicated by respondents, is shown.

Table 21. *Importance of soft skills and competencies on a scale of one to four.*

Survey Question 21	M	SD	t	p	Sig?
h. Critical thinking skills	3.47	0.74	8.61	.000	Y
g. Teamwork	3.44	0.73	8.42	.000	Y
f. Business Ethics	3.37	0.76	7.56	.000	Y
a. Customer service skills	3.26	0.69	7.15	.000	Y
c. Supervisory techniques such as managing people & systems	2.93	0.83	3.41	.001	Y
e. Project management concepts & software	2.90	0.69	3.79	.000	Y
k. Trends in digital communication	2.72	0.73	1.97	.055	N
j. Sales in graphic communications	2.56	0.70	0.54	.589	N
l. History of printing	1.88	0.82	-4.91	.000	Y

Note. n=43; df=42; $p < .05$, two-tailed

Strong agreement is shown regarding the importance and statistical significance of the top four skill sets listed in Table 22. Business owners and managers consider these soft skills as necessary competencies for their employees. The management functions, items c and e, were considered less important, most likely due to the fact that these items do not apply to all of the different positions within the graphic communications organizations. The lack of agreement and statistical significance is noted for a few of the topics, such as trends and sales in graphic communications (items k and j). The actual results showed that the majority of responses were in the "Somewhat important" category, which accounts for the low mean. Interestingly, "J. History of printing"

was considered as not important for including in graphic communications educational programs.

Combined skill sets. For the rest of the discussion on technical and soft skills, Research Questions 4 and 5 will be addressed together due to the fact that they are related, and their survey questions are grouped together.

While the questions related to technical skills and soft skills were grouped together, they were also sub-divided into most of the different career positions found within commercial printing establishments. These include: Administrative, Pre-Media, Production, Customer Service Representative, Management, Sales, and Creatives. For each position, there were two questions on the survey related to specific categories of job skills and knowledge. The first question sought to determine which of the skills and knowledge categories that respondents believed were important, rated on a scale from one to four. The second question required respondents to rank the skills and knowledge on a scale from one to five. The results of each question will be presented arranged by job positions.

Administrative positions. The administrative positions refer to those roles in an organization which are categorized by non-technical knowledge and activities. They could include administrative assistants, estimators, Human Resources personnel, and accountants. These roles were addressed in Survey Questions 4 and 11. Question 4 on the survey read, "For employees in Administrative roles, please choose the level of importance for the items listed

below." The choices were the same for Questions 4 and 11, as well as all of the following related questions. They were as follows:

A. General work habits and skills - positive attitude, organized, self-starter
B. Communication skills - communicates clearly and appropriately
C. Technical skills - computer and software or machine usage as appropriate for the position
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
E. Project Management skills - time management, teamwork, problem solving skills

For scoring purposes, in Question 4 the choices for each item were: Not important=1, Somewhat important=2, Important=3, and Extremely important=4.

Question 11 on the survey read, "For Administrative personnel such as estimators, accountants, and administrative assistants, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important."

These questions both had 45 of the respondents answer them, as opposed to the 51 people who had started the survey. It is theorized that the number of respondents dropped off sharply at these questions due to a misunderstanding of what was being asked. Using the space for the open-ended question

immediately following this section, two respondents chose to provide comments regarding why they felt they were not able to complete this section. Those comments are: (1) “Question 11-17 defaulted to 1-5 in order, I could not change them. General work habits, communication, and technical skills are,” (2) “The above options aren't letting me indicate #'s, but really they are all equally important as indicated above, hard to rank.” (3) “The numbering system doesnt work. I couldnt rank as I wanted to. Numbers go from 1 to 5. You are getting bad data.” and (4) “sorry but the answers above defaulted.” Other participants emailed to say that there was a problem with the instrument. While they seemed to be comfortable with Survey Questions 4-10 which asked them to rate the importance of each item, when forced to rank the five categories in order of importance stating at Survey Question 11, some of the respondents either thought the instrument wasn’t working, or were not able to make the choices necessary for ranking the items from one through five. The results will be discussed for those who did answer these survey questions.

When answering the first question, respondents rated most of the categories fairly high on a scale of one to four. The item with the highest importance, based on mean, was A. General work habits and skills. The item rated the lowest was D. Graphic Communication knowledge. The complete results can be seen in Table 23 and Figure 9.

Table 22. *Comparison of means for survey questions concerning required skills and knowledge for administrative personnel.*

	Question 4 M	Question 11M
A. General work habits and skills	3.84	4.13
B. Communication skills	3.80	3.87
E. Project Management skills	3.67	2.64
C. Technical skills	3.49	2.62
D. Graphic Communication knowledge	2.80	1.73

Note. n=45

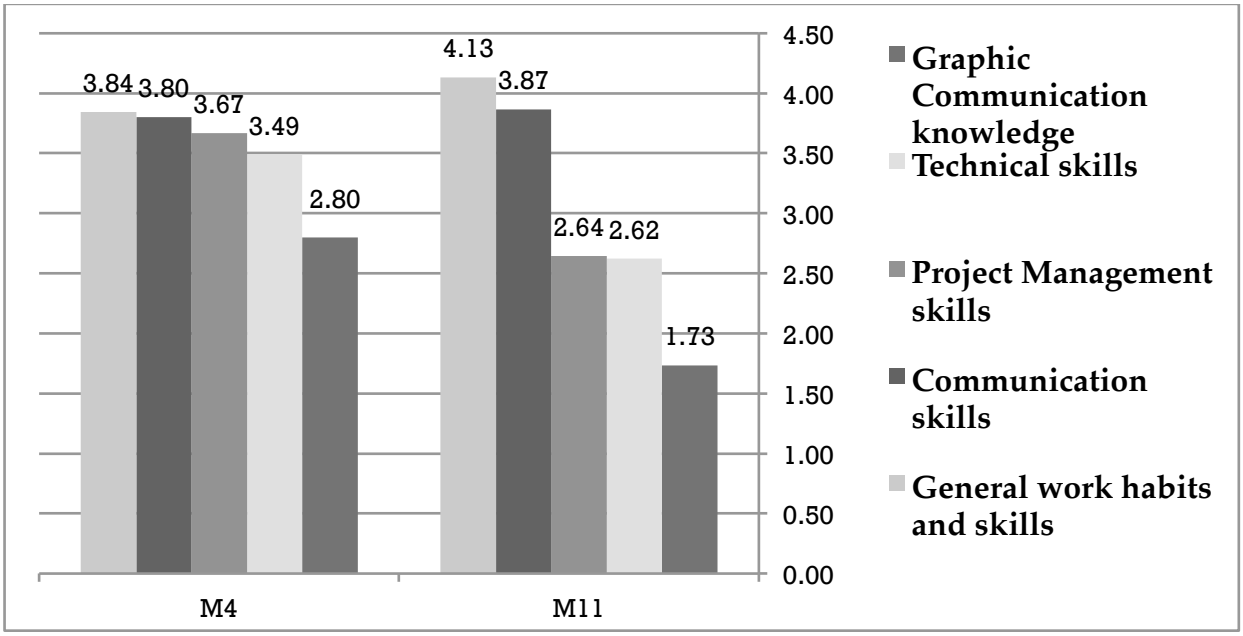

Figure 9. Importance as indicated by rating (Question 4) and ranking (Question 11) required skills and knowledge for administrative personnel.

Considering that Survey Question 4 used a scale of one to four, with a midpoint of 2.5, most of the skills and knowledge categories were rated as "Important" or higher. While the order of importance was similar in the second question related to Administrative positions, respondents' choices were different due to the fact that they could no longer rate all the skills and knowledge as

being high importance. With the question format changed to a ranking system, there was a larger spread between the means of each response. General work habits and communication skills were ranked higher overall, with technical skills less important, and graphic communication knowledge considered the least important. For educators designing curriculum, this gives an indication of the topics to include, and how to prioritize content. However, a larger sample group would be preferred to provide a more statistically significant outcome.

Pre-Media positions. The pre-media positions refer to those roles in an organization which are characterized by technical knowledge and activities. They include personnel who prepare and troubleshoot files for production. This type of role has traditionally been called Pre-press. It includes the group of individuals who review and prepare electronic files to go to output devices such as printing presses and computer monitors or other types of viewing devices. These roles were addressed in Survey Questions 5 and 12. Survey Question 5 is worded just like Survey Question 4. Survey Question 12 is worded just like survey Question 12. The results of these questions can be seen in Table 24 and Figure 10.

Table 23. *Comparison of means for survey questions concerning required skills and knowledge for Pre-media personnel.*

	Question 5 M*	Question 12 M**
A. General work habits and skills	3.73	3.84
C. Technical skills	3.78	3.84
B. Communication skills	3.40	2.91
D. Graphic Communication knowledge	3.42	2.56
E. Project Management skills	3.33	1.86

Note. *n=45, **n=43

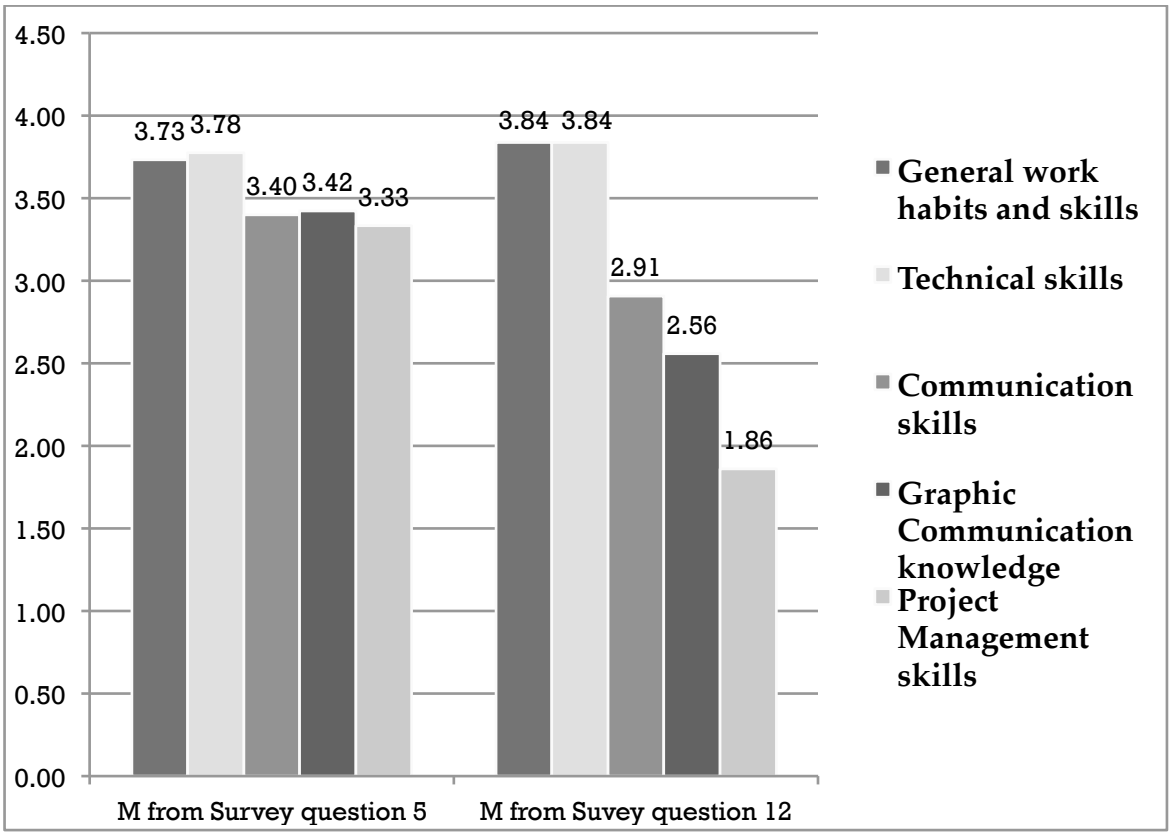

Figure 10. Importance as indicated by rating (Question 5) and ranking (Question 12) required skills and knowledge for Pre-media personnel.

As with the Administrative roles, respondents rated all of the listed skill and knowledge categories as "Important" or higher, with means ranging from 3.33 to 3.78 on a scale of one to four. The results of Survey Question 12 indicate that the most important categories are "A. General work habits and skills" and "C. Technical skills," with both having a mean of 3.84. The third most important item is "B. Communication Skills" with a mean of 2.91. These results indicate the importance of soft skills, even for a position which requires a great deal of technical knowledge.

Production positions. The production positions refer to those roles in an organization which are characterized by technical knowledge and activities. They include press operators, finishing and binding personnel, and other production functions. These roles were addressed in Survey Questions 6 and 13. The data results for these questions are found in Table 25 and Figure 11.

Table 24. *Comparison of means for survey questions concerning required skills and knowledge for Production personnel.*

	Question 6 M*	Question 13 M**
A. General work habits and skills	3.73	4.54
C. Technical skills	3.36	3.51
B. Communication skills	3.22	2.85
D. Graphic Communication knowledge	2.96	2.22
E. Project Management skills	3.02	1.88

Note. *n=45, **n=41

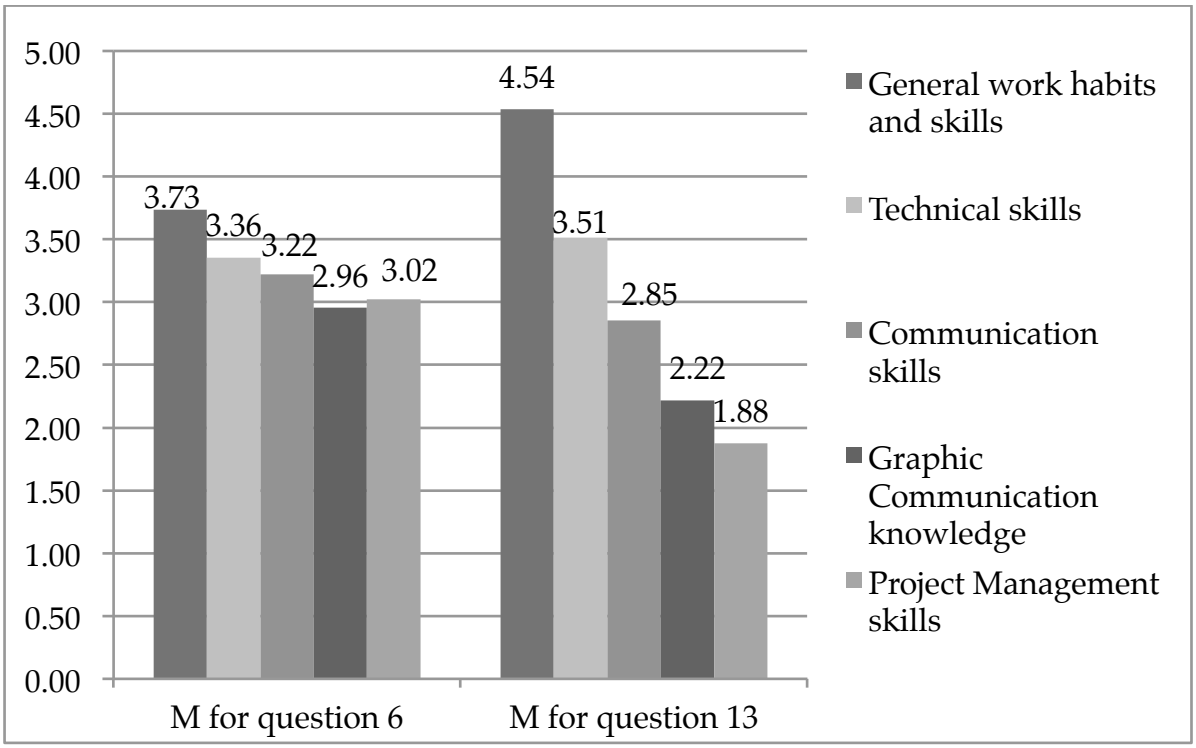

Figure 11. Importance as indicated by rating (Question 6) and ranking (Question 13) required skills and knowledge for Production personnel.

All of the categories for skills and knowledge were rated in a close grouping of the means for Production personnel. The range of means was from 2.96 for "E. Graphic Communication knowledge" to 3.73 for "A. General work habits and skills." For the ranking of skills and knowledge for personnel in production roles, respondents indicated a strong indication that "A. General work habits and skills" are the most important category for skills and knowledge with a mean of 4.54, followed by "C. Technical skills" with a mean of 3.51.

Customer Service Representatives (CSR). The CSR positions refer to those roles in an organization which are characterized by both technical and non-technical knowledge and activities. They typically act as liaisons between the

customer and the in-house production and sales personnel. These roles were addressed in survey Questions 7 and 14. The results can be seen in Table 26 and Figure 12.

Table 25. *Comparison of means for survey questions concerning required skills and knowledge for Customer Service Representatives.*

	Question 7 M*	Question 14 M**
A. General work habits and skills	3.87	4.15
B. Communication skills	3.93	4.12
E. Project Management skills	3.62	2.39
D. Graphic Communication knowledge	3.22	2.22
C. Technical skills	3.22	2.12

Note. *n=45, **n=41

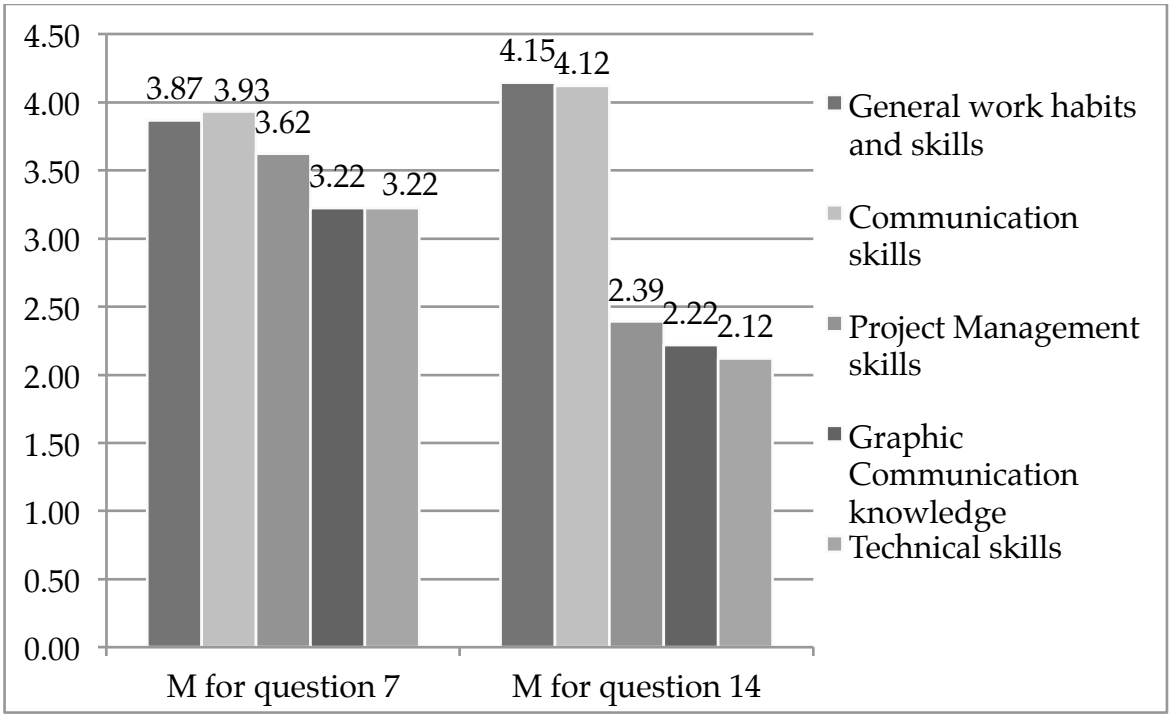

Figure 12. Importance as indicated by rating (Question 7) and ranking (Question 14) required skills and knowledge for Customer Service Representatives.

While the ratings for the skills and knowledge for CSRs are pretty close, the rankings for those same categories exhibit a much wider range. The means for the rating of skills and knowledge are from 3.22 to 3.93 on a scale from one to four. In contrast, two of the categories are over 4.10 for their means on a scale of one to five, and the rest of the items are from 2.12 to 2.39. This indicates a clear sign that soft skills such as general work habits and communication skills are very important for CSRs.

Management personnel. The Management positions refer to those roles in an organization which are categorized by mostly non-technical knowledge and activities. They could include personnel in supervisory positions, from managing people and processes in specific areas to management of the entire organization. These roles were addressed in survey Questions 8 and 15. The data can be seen in Table 27 and Figure 13.

Table 26. *Comparison of means for survey questions concerning required skills and knowledge for Management personnel.*

	Question 8 M*	Question 15 M**
A. General work habits and skills	3.82	4.15
B. Communication skills	3.96	4.05
E. Project Management skills	3.82	2.95
D. Graphic Communication knowledge	3.40	2.10
C. Technical skills	3.24	1.74

Note. *n=45, **n=39

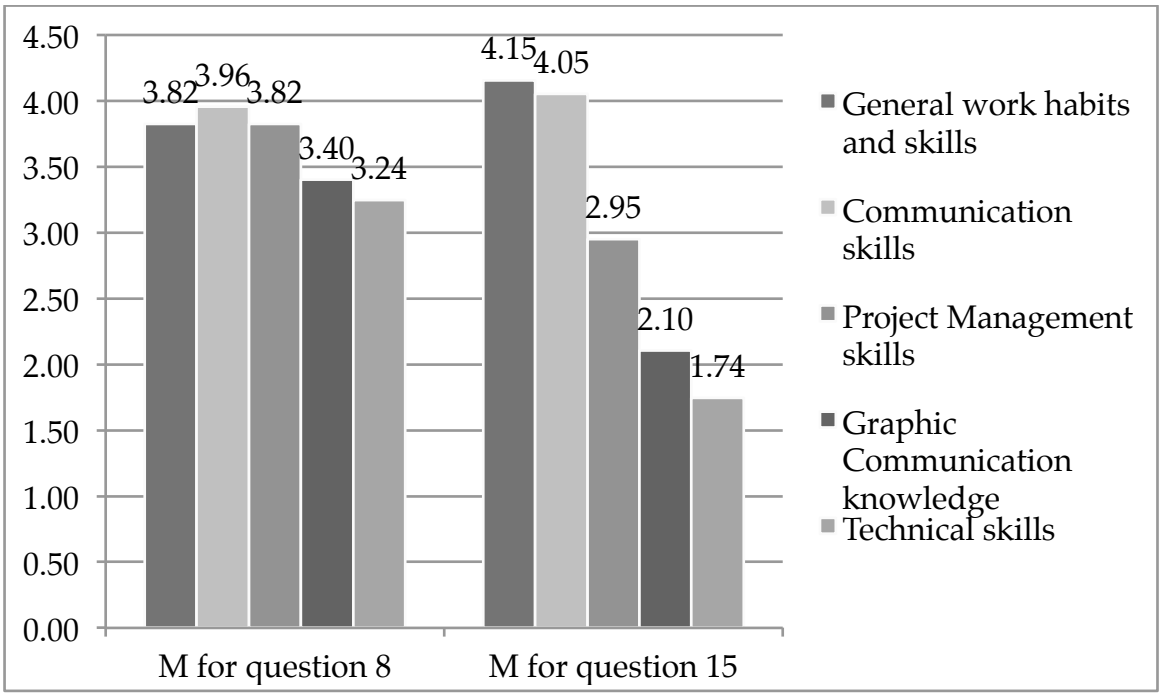

Figure 13. Importance as indicated by rating (Question 8) and ranking (Question 15) required skills and knowledge for Management personnel.

Once again, the means for the rating of the skills and knowledge categories indicate that they are all considered between "Important" and "Extremely Important." The ranking of skills for Management personnel is similar to that for CSRs. There are two categories, A and C, close to the high end of five, and the rest are all below three.

Sales personnel. The Sales positions refer to those roles in an organization which are characterized by non-technical knowledge and activities. They include personnel who work directly with customers to procure jobs and establish relationships. These roles were addressed in Survey Questions 9 and 16. The data can be seen in Table 28 and Figure 14.

Table 27. *Comparison of means for survey questions concerning required skills and knowledge for Sales personnel.*

	Question 9 M*	Question 16 M**
A. General work habits and skills	3.82	4.45
B. Communication skills	3.93	4.35
D. Graphic Communication knowledge	3.09	2.30
E. Project Management skills	3.36	2.03
C. Technical skills	2.58	1.88

Note. *n=45, **n=40

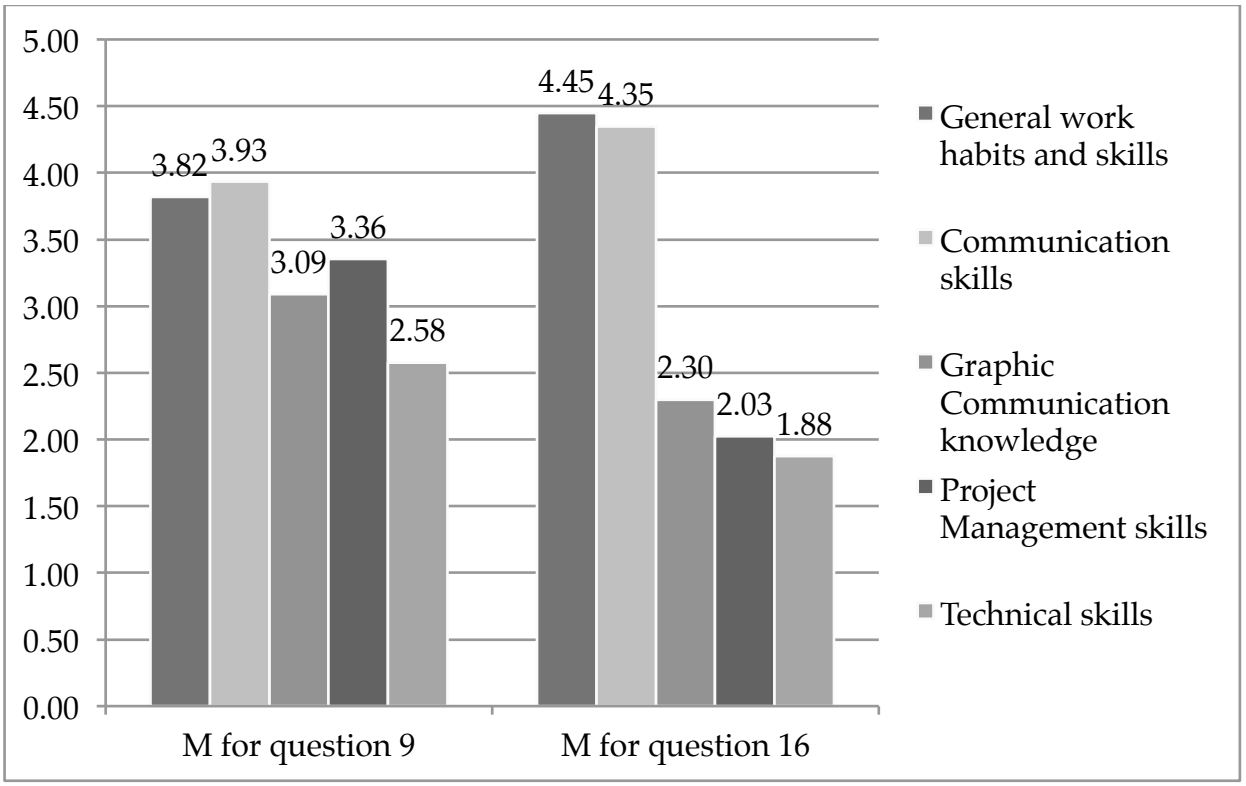

Figure 14. Importance as indicated by rating (Question 9) and ranking (Question 16) required skills and knowledge for Sales personnel.

While all of the skills and knowledge categories were rated as important for sales personnel, "B. Communication skills" was rated the highest with a

mean of 3.93. This was followed closely by "A. General work habits and skills" with a mean of 3.82. For ranking the skills, in Survey Question 16, the same two categories stood out as important, with means over four on a scale of one to five. The rest of the categories were all around a mean of two and grouped fairly close.

Creatives. The Creative positions refer to those roles in an organization which are categorized by technical knowledge and activities. They could include personnel who work with photography, graphic design, and/or illustration. This position is not generally included in a small to medium-sized commercial printing company. However, they are an integral part of the industry. These roles were addressed in survey Questions 10 and 17. The data can be seen in Table 29 and Figure 15.

Table 28. *Comparison of means for survey questions concerning required skills and knowledge for Creative personnel.*

	Question 10 M*	Question 17 M**
A. General work habits and skills	3.64	3.90
C. Technical skills	3.64	3.67
B. Communication skills	3.44	3.05
D. Graphic Communication knowledge	3.27	2.41
E. Project Management skills	3.44	1.97

Note. *n=45, **n=39

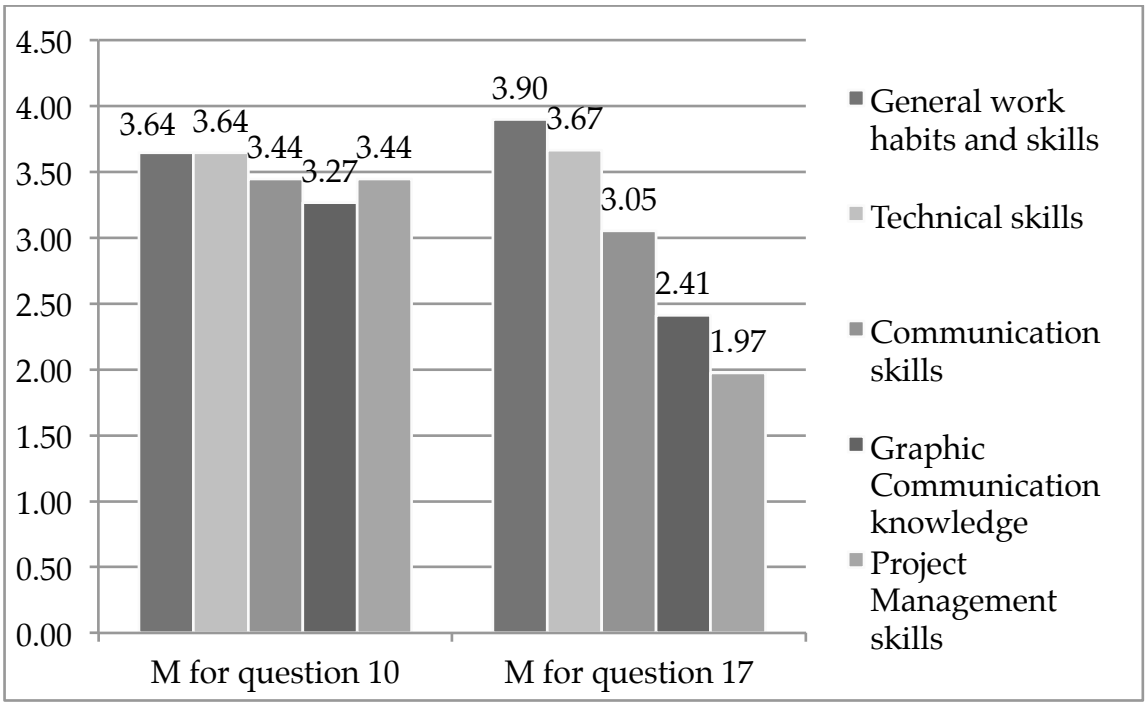

Figure 15. Importance as indicated by rating (Question 10) and ranking (Question 17) required skills and knowledge for Creative personnel.

As with the previous positions, all of the categories are rated as being important with means above three one a scale of one to four. What is somewhat surprising is that for Creatives, where skill with software such as the Adobe Creative Suite and hardware such as cameras and computers are the mainstay of their positions, respondents still indicated that "A. General work habits and skills" was the most important when ranking the categories. The rest of the categories did follow more closely than with some of the other positions, indicating that with the overall spread, there was less agreement between respondents on the ranking of the categories.

What are employers looking for? In order to gain additional insight into the desired competencies for future graphic communications personnel, an open-ended question followed the more structure rating and ranking questions regarding technical and soft skills. Survey Question 18 was, "If you were hiring, what would you look for in a graphic communications employee? Please add any additional thoughts on necessary skills." Twenty-one people gave responses. The responses were grouped into categories and the number of times each was listed was calculated. The results can be seen in Table 30.

Table 29. *Results of open-ended question asking for desired competencies.*

Attributes	*f*
Good attitude	6
Communication	3
Teamwork	3
Listen and take direction	3
People who are willing to show initiative	3
Willing to learn	3
Technically proficient with all applicable software programs (Adobe and Microsoft)	3
Effective project management skills	1
Balance between someone with real talent and one who will accept a lower salary	1
Excellent work habits	1
Understanding that the business is about making money, not art	1
Creative and willing to try new ideas	1
Punctual	1
Dressed like a professional	1
Quality of character, commitment to integrity and best practices	1
Technical - know print production and set-up, i.e. bleeds	1
Flexibility and versatility	1

Note. n=21

Table 30 clearly shows the importance of soft skills such as communication and teamwork. This adds support to the fact that for most of the job positions in graphic communications, respondents indicated that "A. General work habits and skills" was one of the most important categories, even above "C. Technical Skills." Another way to consider these items is the balance between technical and soft skills. By putting the items from Table 30 into this type of grouping, there are two items that are considered technical skills. The other 16 are based on non-technical or soft skills, as seen in Table 31.

Table 30. *Comparison of open-ended responses from Survey Question 18 when grouped into soft skills and technical skills.*

Soft Skills	Technical Skills
• Good attitude • Communication • Teamwork • Listen and take direction • Willing to show initiative • Willing to learn • Effective project management skills • Balance between someone with real talent and one who will accept a lower salary • Excellent work habits • Understanding that the business is about making money, not art • Creative and willing to try new ideas • Punctual • Dressed like a professional • Quality of character, e.g. commitment to integrity and best practices • Flexibility and versatility	• Technically proficient with all applicable software programs (Adobe and Microsoft) • Understand print production and set-up, i.e. bleeds

Note. n=21

Some of the actual statements collected for Survey Question 18 express what employers, at least the 21 who responded to this particular survey question, would like in their future employees. These include:

1. “"Tingle Factor" (vs "Technical Factor"). We look for persons who are self-motivated, enthusiastic, eager to learn and to grow. These people will take initiative to learn any required technical skills.”
2. “Positive Attitude.....I can teach everything else.....”

Summary of Technical Skills and Soft Skills

When given the choice in the first set of questions for each job position, respondents indicated that all of the listed skills and knowledge categories were at least somewhat important given the following scale: Not important=1, Somewhat important=2, Important=3, and Extremely important=4. Most had a means over three, indicating that overall the skills and knowledge categories were all considered as Important or Extremely Important.

For the second set of questions for each job position, respondents ranked “A. General work habits and skills” as the most important category for all seven of the positions. For the second most important category, “C. Technical skills” was ranked next for Pre-media, Production, and Creatives. For the rest of the positions, “B. Communication skills” was ranked second. For Pre-media, Production, and Creatives, “B. Communication skills” was ranked third.

Telephone Interviews

The second phase of the data collection consisted of conducting telephone interviews with the volunteers from the survey respondents. Twenty-two people volunteered to be contacted for interviews. Each person was called from one to three times to conduct the interview. The interviews were completed with 11 of the volunteers. Nine were recorded using an Android call recording application as discussed in Chapter 3. For one of the calls that was recorded, the recording quality was extremely poor and it was impossible to create a transcript. Two of the calls were not recorded because they were either made before the recording app was purchased, or it was not turned on when the respondent called back. For these calls, notes were taken during the interview. These were typed up and included in the analysis. Therefore the total was nine actual transcripts, and two interviews that had extensive notes taken for analysis.

The transcriptions and notes were analyzed using Framework Analysis, as discussed in Chapter 3. A matrix format was created to categorize and tabulate the information from each interview. The results will be addressed in terms of their relationship to the Research Questions.

Automation and Computerization

Only a few of the topics which were discussed during the telephone interviews pertained to Research Question 1, which was "What is your organization's forecasted level of involvement and implementation with computerization and automation of processes in the next 10 years?" There were,

however, several people who talked about some of the trends, such as electronic storefronts. The results are shown in Table 32.

Table 31. *Telephone interview data that pertains to automation and computerization.*

	f
Will need someone to handle web front-end (electronic storefront) work	4
Know how to work with more automated operations	1

Note. n=11

Electronic storefronts are a method for customers of commercial printing companies to order their products through an Internet interface. Externally, it presents an option for customers to manage their own ordering. Internally, it automates the sales and ordering process, especially in the case of re-orders.

A specific example of automation of processes involved employees using a consistent file-naming scheme. When this is done, the company can get out a job proof and postage estimate within 10 minutes. This is much more automated and efficient than the traditional process.

Ancillary Products and Services

There were also just a few topics from the telephone interviews related to Research Question 2, which was "What is your organization's forecasted level of involvement and implementation with offering ancillary products and services in the next 10 years?" The results are shown in Table 33.

Table 32. *Telephone interview data that pertains to ancillary products and services.*

	f
Fulfillment services, e.g. collateral management	1
Design a web site and brochure to match – opposite of current practices	1

Note. n=11

There is also some overlap from one of the topics in Table 32. Companies who provide collateral management may use an electronic storefront to do so. A statement from one of the interviewees sums it up well:

> I would say the one thing that everybody should be aware of and it will… it's all going to be this way is online processing, ordering, designers, FTP, online. Maybe it's an electronic store front, maybe it's an online access to your customer database that they can upload their own files.

Customer Relationships

For Research Question 3, "What is the effect, if any, of a changing relationship between your organization and your customers in terms of achieving more of a partner or consultant status?" there were also a few topics form the phone interviews. These can be seen in Table 34.

Table 33. *Telephone interview data that pertains to the nature of customer relationships.*

	f
Sales approach needs to change	3
Improved customer service skills	1

Note. n=11

The changing relationship between commercial printers and their customers will have a large impact on the sales approach. It is through the

connections between the sales staff and the customers where the products and services change from commodities to solutions. As one interviewee put it, "You have to understand your customer's business. And you need to be smart enough to make recommendations of how you can help them do what they need to do. "

Technical Skills

Research Question 4, "What are the major technical skills that you predict will be needed by your personnel in the next 10 years?" yielded more results from the telephone interviews. These results can be seen in Table 35.

Table 34. *Telephone interview data that pertains to needed technical skills.*

	f
Will need someone to handle web front-end (electronic storefront) work	4
Understand the requirements of prepping for print	2
Understand what true camera ready is	2
Understand how to set up and work with VDP, including databases like Excel.	2
Graphic design - don't overdo it with all the extras. Not everyone who has a computer is a designer.	1
Need people who are already trained to run the equipment, esp. press.	1
Stay current with technology like Adobe CS	1
Technical skills are important but secondary	1
The more complex work, like VDP, will need good employees with skills	1
Web site maintenance	1

Note. n=11

Consistent with the topics from Research Question 1, a needed skill set will be to handle the web front-end for an electronic storefront. The respondents do not need a person who is a computer programmer. Rather, they want someone who can cross over with some computer savvy, and also knowledge of the needs in graphic communications. Additional needs include understanding the specific requirements of setting up files for print, keeping current with the industry standard software, and being able to manage and work with Variable Data Printing.

Non-Technical or Soft Skills

Respondents seemed to feel the most strongly regarding the topics for Research Question 5, "What are the major soft or non-technical skills that you predict will be needed by your personnel in the next 10 years?" The many results can be seen in Table 36.

As with the data collected from the survey, respondents included many types of soft skills that they believe are both necessary and lacking for employees. Overall, this represented the need for a good attitude, very good communication skills, and an understanding of the workflow from start to finish, gained through an internship or job experience. It was during these discussions that interviewees indicated that soft skills were at least as important as the technical skills. Some pointed out that given two candidates with very similar technical skills, the one with better soft skills would be chosen for the job.

Table 35. *Telephone interview data that pertains to needed soft skills.*

	f
Be open to opportunities and don't be afraid to try new things	7
Real-world experience, i.e. internships	5
Good communication skills.	4
Understand the workflow from start to finish	4
Flexibility; Be able to wear a lot of hats	3
Teamwork	3
Listening skills	2
Good work ethic	1
Project management	1
Ability to problem solve	1
Technical skills are important but secondary	1
Willing to start at the bottom	1
Understand that theory from education is different from real-work in the workplace	1

Note. n=11

Not surprisingly, there were topics which came up during the phone interviews that did not relate precisely to the Research Questions. These topics are presented in Table 37.

Overall, the data in Table 37 indicate that industry professionals are looking to academic programs to reach out and make contact with them. They would like to be informed when there are students who are available for internships and jobs. Also, they are very receptive to having students tour their facilities. The other theme that developed was a concern that instructors are familiar with the current methodology in the field, and that they teach current techniques and concepts.

Table 36. *All other information from telephone interviews that does not directly relate to Research Questions.*

	f
Have a pipeline between school and business - the school needs to be more pro-active	4
Companies have to evolve - find niche either through product/services or in a vertical market	2
Have teachers who are current professionals in the field	1
Set up tours for students - help make the introductions between students and employers	1
Stop teaching old things	1
Trend: the gap between small companies and large companies is getting wider.	1

Note. n=11

Summary of Telephone Interview Data

The telephone interviews yielded quite a few different topics related to the research questions for this study. One of the recurring themes is the requirement for soft skills. A statement that sums up the need for them, and also indicates the ramifications for curriculum design, is:

> Their value that they create is more around communication and it's the soft skills. I just see an absence of it. I think if you possess those types of skills, now you can get anything you want, frankly. I would continue to encourage educators to be sure you don't forget about that. Technology is great, but how is somebody going to communicate it and share it and discuss it and all of those good things.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Summary, Conclusions, and Recommendations

In this chapter, the summary, conclusions, and recommendations will be presented. These will serve to make meaning from the many processes that have gone into this project. The summary is an overview of the components of the dissertation. The conclusions address the five research questions and how the results can be used to answer them. The recommendations include potential strategies for applying the findings to curriculum design, as well as suggestions for changes that could be made to successfully conduct a related study.

Research Summary

This project sought to address the problem of a lack of qualified employees that is projected to exist in the next five to ten years in the graphic communications industry. The reasons for this were discussed in Chapter 1, and can be summarized as a large number of retiring workers compounded with extensive changes in technology, causing new employees with various skill sets to be needed.

A comprehensive review of the graphic communications literature in Chapter 2 created a foundation of understanding for the issues, as well as served to provide the topics and direction for the creation of the data instruments. The processes and steps taken to study these issues were described in Chapter 3.

The results of the data collected with the survey and telephone interviews were discussed in Chapter 4. As indicated, the response rates were unfortunately

quite low, throwing into question the ability to extrapolate the results to the larger population of commercial printing establishments throughout the United States. However, statistical significance was shown to exist for many of the items studied. These can be used as new information to apply to curriculum design in graphic communications/technologies programs. In addition, some patterns were determined that are consistent with the trends found in the literature. The overall conclusions will be discussed as they relate to the research questions, which are:

1. What is your organization's forecasted level of involvement and implementation with computerization and automation of processes in the next 10 years?
2. What is your organization's forecasted level of involvement and implementation with offering ancillary products and services in the next 10 years?
3. What is the effect, if any, of a changing relationship between your organization and your customers in terms of achieving more of a partner or consultant status?
4. What are the major technical skills that you predict will be needed by your personnel in the next 10 years?
5. What are the major soft or non-technical skills that you predict will be needed by your personnel in the next 10 years?

These questions are designed to address the larger overall question, "What impact will technical and business process trends in the graphic communications industry have on the required competencies of its future personnel?"

Conclusions

Automation and Computerization

Research Question 1 seeks to determine what the specific trends are and the degree to which computerization and automation will be used in the workflow and processes within a commercial printing organization. When combining all of the results together from the survey and the telephone interviews, the major forecasted trends in terms of automation and computerization appear to be electronic storefronts, using MIS and computerization for business processes, and automation of the job workflow. The quantitative data from the survey provided a fairly strong indication that these trends will be present and continuing and/or increasing. The qualitative questions from the survey were less focused on those specific issues. However, some of the trends were specifically brought up by respondents during the telephone interviews.

A major trend that interviewees discussed was the addition or continuance of an electronic storefront, also known as web-to-print. This trend actually pertains to both Research Questions 1 and 2 in the way that it affects the commercial printer's organization. This speaks to the organic nature of workflow within organizations, but especially within the graphic communications

industry. As was discussed with the workflow diagrams in the literature review section of this paper, the roles and tasks within the workflow are becoming less and less isolated. Efficiency dictates, and technology changes provide for, the merging of many functions. The way that this applies to the trend of providing electronic storefronts can be seen in the nature of what an electronic storefront entails. Essentially, the commercial printer provides an electronic, Internet based portal, for the end customer to view and purchase products. These products are typically items they have purchased before, e.g. business cards and brochures. The ongoing purchases are then re-orders of the same, or slightly modified, items. Customers can place, view, and manage their own orders. This results in the need for future employees who have fundamental computer programming skills.

Regarding computerization of business processes and the workflow, the quantitative results showed strong agreement for the importance of these trends. However, the qualitative results, both from the survey and the phone interviews, had only minor mention of these trends. This could be due to the fact that it is so commonplace and accepted as to be not as noteworthy as some of the other topics that respondents wanted to discuss.

Auxiliary Products and Services

In looking at the results for Research Question 2, specific trends emerge. Organizations are planning to provide services for collateral management and fulfillment in general, personalized web addresses, variable data printing/marketing, and creating web sites for customers. There were several

other products and services listed in the survey which did not receive a high level of confidence. Some were not surprising, such as providing pad printing services, due to the fact that it is typically far outside of the realm of even a larger commercial printer. Others, such as providing output to mobile devices, received surprisingly low ratings for importance. However, in the open-ended comments on the survey two of the respondents did indicate that smartphone applications would have an impact on commercial printing. This could include the need for output to mobile devices.

Providing variable data printing/marketing services was also supported by the results, which is not surprising given the large amount of coverage this topic has received in the literature. The survey results supported this topic, as did the content of the telephone interviews. Specific competencies were mentioned as being needed for this type of service, such as the ability to manage a database with Microsoft Excel and other similar software programs. Another aspect of organizations providing this service is that some are also bringing the mailing functions in-house. This involves another group of skills and knowledge that future employees will need to posses.

While results on the quantitative portions of the survey did indicate that creating web sites for customers will be important, the qualitative data are mixed if not contradictory. In general, commercial printers see providing a complete web creation service as too far outside of their comfort zone. Some of the interviewees, however, indicated that they contract with outside companies to

provide web development services that are managed by their internal employees.

Relationships Between Commercial Printers and Customers

Research Question 3 addresses the nature of the changing relationship between the commercial printer and their customers. According to the literature, in order to be successful, companies will have to get more involved in their customer's business. Instead of merely offering a quote when a job needs to be produced, such as printing brochures, the commercial printer needs to take more of a solutions-oriented approach. The data collected in the survey indicates that respondents strongly agree that the nature of their relationships with their customers needs to change to more of a partnership approach. The part of the business that will drive this change will be the sales staff. Based on the qualitative data collected in the survey, respondents stated that becoming a partner with their customer is the key to success. One person summed it up as follows: "We strive to provide printing and related services to our customers to keep them satisfied and build long term relationships." The qualitative data gathered during the telephone interviews echoed those same ideas. It can be concluded that a new emphasis on customer relations would be a beneficial topic for graphic communications/technologies curriculum.

Technical and Non-Technical or "Soft" Skills

Research Questions 4 and 5 will be addressed together, given the fact that they are closely related and grouped together on the survey.

When it comes to technical skills and soft skills, employers are clearly indicating a need for soft skills along with technical knowledge. Some of the desired competencies were expressed more in the form of attitudes, which are difficult if not impossible to teach. What can be "taught," or at least enhanced in the classroom, are interpersonal skills such as good communication, effective teamwork, project management, and the knowledge of how important adaptability and flexibility are to success.

The quantitative results for both rating and ranking the categories of skills and knowledge for all the different job positions show a clear preference for soft skills such as general work habits and communication skills. This is supported by the content of the transcripts and notes from the telephone interviews. The respondents discussed at length about both the absence and importance of "soft" skills such as communication, teamwork, good work ethic, listening skills, and problem solving. One respondent stated, "But for me personally, there just seems to be an absence of individuals who have the ability to communicate effectively, to engage customers, to problem solve, to be part of a team."

Many of the interviewees stated that internships and "real-world" experience were the best way to prepare for a career in graphic communications. The other topic that many felt was important was for future employees to have a better understanding of the mechanics and day-to-day operations of the organization. Again, this should come from real-world experience.

One interviewee summed up the attitude that employers are looking for by saying that educators should tell students to be active participants in the

company where they are working. They need to do what needs to be done, and not feel that they should start out “on the top.” For example, "If you use the last of the toilet paper, you replace the roll." They recommend that employees do "Simple things that show that you really care about the company and its presentation to the rest of the employees and the world."

Recommendations

This study has provided some statistically indicated patterns and trends, as well as good anecdotal evidence, of topics to include in graphic communications curriculum design. However, there are also concerns and limitations of the extent to which this data can be extrapolated to the larger population of graphic communications professionals in the United States. Therefore, further research is needed to determine with more certainty the competencies that are required for the various positions within the graphic communications field. To assist with repeating a study such as this one, recommendations will now be provided.

Research Design and Methodology

Sample group. The first challenge with the identification of the sample was focusing in on one area of the graphic communications industry. When consulting references such as the Bureau of Labor Statistics for classifications of industries, there are many types of companies that could be included with some relation to graphic communications. They run the gamut from manufacturing to service industries to graphic design and marketing. For this study, the designation of commercial printers was chosen due to the fact that it does

encompass not only a large portion of the industry, but also a good variety of products and services. When replicating this survey, it needs to be decided if that is an adequate parameter to utilize.

Once the guidelines are established on which types of companies to include, steps need to be taken to increase the number of respondents. This was another challenging aspect of this study. The recommendation would be to work with professional organizations to get access to their mailing lists. Consult multiple organizations, to avoid a sample bias by only having companies that belong to certain types of organizations, unless they are large enough to provide a good sample group. It might also be better if someone well regarded in the field would be willing to send out an email with a message regarding the importance of the study.

Instrumentation design. Once a sample group and method of reaching them is identified, the design of the instrumentation needs to be addressed. For this study, considerable thought was given to ease of use for the respondents. The literature recommends keeping surveys short enough that respondents do not get frustrated and close without finishing. While this is important, it is equally important to have instruments that coincide with data collection and analysis needs. One recommendation is to strike a better balance on the survey instrument between ease of use and type and categories of usable data. It needs to be designed and organized for data analysis. Make sure that all data collection prompts, both for quantitative and qualitative, lead to answering the research questions. It's beneficial to be flexible; however, not to the point of sacrificing

efficiency and creating volumes of data that don't fit within the study. For example, if there are questions that will need to be compared to each other, make sure that they are set up in a consistent manner. While this sounds like common sense, it is easy to overlook.

Regarding the telephone interviews, the script erred on the side of caution and brevity. Most respondents were eager to share ideas and very generous with their time. Additional questions could have been prepared for those who were willing to continue to discuss the topic.

Related Topics to Investigate

As with most studies, this process raised questions in addition to answering them. One such question concerns the extremely low response rate, especially given all the efforts at contacting individuals to participate. The question bearing further study would be why this occurred, and if it is peculiar to this particular industry. For example, are there any inferences or implications that can be drawn from the sample group's reluctance to participate? Is it part of their culture to protect company secrets? Or are they simply pressured by all the same time constraints of many others in current society, along with suffering from information overload? A related question would be whether or not the business owners and managers are the only group to target for answers to the larger questions. Should groups such as graduates and instructors of graphic technologies programs be included? Would it be possible to get input from the manufacturers of the equipment and software for the industry? These are

questions raised during the course of this study, which could be addressed in future studies.

Discussion Starting Point

One final recommendation is for educators to use this study as a discussion starting point with industry professionals in your area. Given the eclectic nature of the industry, and the incredible speed at which technology changes and affects business and technical processes, an ongoing conversation with members of an advisory board or other similar groups could be very beneficial to related educational programs.

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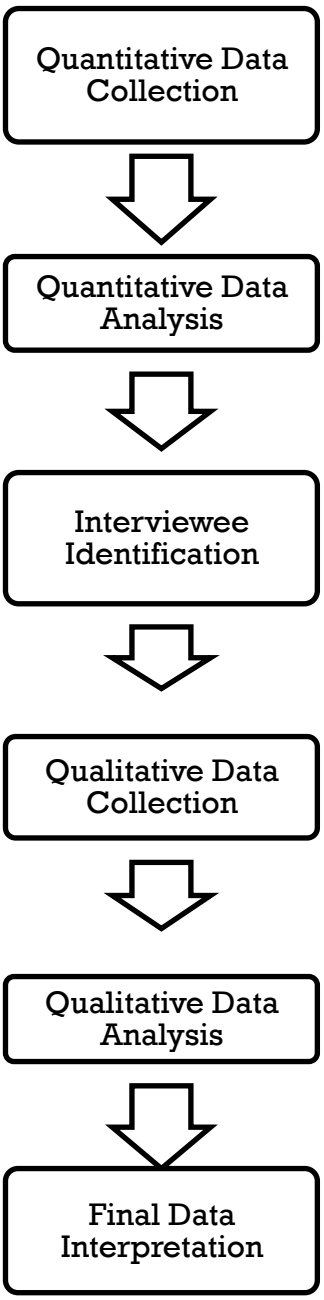
APPENDIX A:

VISUAL MAP OF MIXED METHODS PROCEDURES

Figure A1: Sequential Explanatory Design for Mixed Methods Procedure



Phase	Procedure	Product
Quantitative Data Collection	• Cross-sectional web-based survey (N=300). Stratified population.	• Numeric data
Quantitative Data Analysis	• gpower • Microsoft Excel • SPSS	• Descriptive statistics • Results to form questions for individual interviews
Interviewee Identification	• Use results of survey to identify minimum 10 respondents willing to be contacted	• List of participants for qualitative data collection
Qualitative Data Collection	• Conduct individual in-depth telephone, semi-structured interviews (N=10)	• Text data (interview transcripts and notes) •
Qualitative Data Analysis	• Coding of responses	
Final Data Interpretation	• Explanation of the meaning of quantitative and qualitative results	• Discussion • Recommendations for future studies

APPENDIX B:

QUESTIONNAIRE – FINAL DRAFT OF SURVEY

Introduction to Survey

Dear Graphic Communications Professional,

This message is an invitation to participate in a research study of "Graphic Communications Industry Trends and Their Impact on the Required Competencies of Personnel," which I'm conducting as part of my doctoral program at the University of Northern Iowa. Your involvement in this study is greatly appreciated!

The purpose of this study is to: 1) determine the major industry trends that business owners and managers believe will be most important in the near future; and, 2) identify the skills and competencies that will be most needed by the future workforce of the graphic communications industry.

You are one of nearly 400 invited participants. You have been invited because of your involvement with the graphic communications industry, and/or your affiliation with one of the following organizations: (1) the Printing Industry of the Midlands; or (2) Association for Technology, Management, and Applied Engineering.

After reading this consent letter, you may choose to participate in this study by clicking on the GraphComm Industry "link" at the bottom of this page. This online survey will take up to 20 minutes to complete. Completing the survey poses minimal risk to you. Your responses will be kept anonymous and no individual data (only combined data) will be reported. Information obtained during this study which could identify you will be kept confidential. The summarized findings with no identifying information may be published in an academic journal or presented at a scholarly conference. While this study will not result in any direct benefit or compensation to you, your responses may benefit the field of graphic communication by providing an industry professional's viewpoint. Educators might use your ideas to shape curriculum to best prepare the future personnel of the graphic communications industry. In addition, the results may be made available for you to view when the study is completed.

Within the survey, you may choose to provide your contact information for the second part of the study, telephone interviews. This is not required and separate from the questionnaire.

Your participation in this study is completely voluntary. You are free to withdraw from the study at any time without penalty and may choose not to answer any questions you prefer not to answer.

Finally, if you have questions about the study or desire information in the future regarding your participation or the study generally, you can contact me at 319-273-2746 or my faculty advisor, Dr. Mohammed Fahmy, at the Department of Technology, University of Northern Iowa 319-273-2758. You can also contact the office of the IRB Administrator, University of Northern Iowa, at 319-273-6148, for answers to questions about rights of research participants and the participant review process.

Please answer all survey questions honestly and to the best of your ability.

THANKS for taking the time to help me with my doctoral dissertation research!
~Sara Smith

By completing and submitting this online questionnaire, I indicate my willingness to participate in this study.

1. What do you project your company's involvement or implementation to be within the next 10 years regarding:

	No interest, involvement or implementation	Interested and researching	Some degree of implementation	Heavy involvement or implementation	Not sure
Creating web sites for your customers	○	○	○	○	○
Providing Web to Print services	○	○	○	○	○
Using MIS and computerization for job orders, job tracking, invoicing, etc.	○	○	○	○	○
Providing Fulfillment services for your customers	○	○	○	○	○
Offering pad printing services, such as for promotional products	○	○	○	○	○
Using PURLs and/or other types of personalized web addresses for your customers	○	○	○	○	○
Offering Variable Data Printing or Variable Data Marketing services	○	○	○	○	○
Using automated workflow solutions such as Prinergy, Rampage, etc.	○	○	○	○	○
Automating your workflow using Job Definition Format (JDF)	○	○	○	○	○
Offering dye sublimation printing services	○	○	○	○	○
Providing output to ebooks, iPad/tablet, or other mobile formats	○	○	○	○	○
Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital	○	○	○	○	○

2. For each of these trends, would your future involvement represent an increase or decrease in involvement and/or implementation compared to what your company is currently offering:

	Increase somewhat	Increase significantly	Stay the same	Decrease somewhat	Decrease significantly	Not Applicable
Creating web sites for your customers	○	○	○	○	○	○
Providing Web to Print services	○	○	○	○	○	○
Using MIS and computerization for job orders, job tracking, invoicing, etc.	○	○	○	○	○	○
Providing Fulfillment services for your customers	○	○	○	○	○	○
Offering pad printing services, such as for promotional products	○	○	○	○	○	○
Using PURLs and/or other types of personalized web addresses for your customers	○	○	○	○	○	○
Offering Variable Data Printing or Variable Data Marketing services	○	○	○	○	○	○
Using automated workflow solutions such as Prinergy, Rampage, etc.	○	○	○	○	○	○
Automating your workflow using Job Definition Format (JDF)	○	○	○	○	○	○
Offering dye sublimation printing services	○	○	○	○	○	○
Providing output to ebooks, iPad/tablet, or other mobile formats	○	○	○	○	○	○
Providing Content Management or Digital Asset Management Services (DAM), such as re-purposing your customer's content for multiple types of output both printed and digital	○	○	○	○	○	○

3. Do you have any other thoughts or predictions on how upcoming trends in the Graphic Communications industry will change how you do business?

Section 2: Future Personnel Skills and Knowledge

In this section, you will consider the following potential skills and characteristics of personnel in the graphic communications field. In your opinion, which are the most necessary and/or desired for each category of employees? Using the radio buttons, click to indicate the importance of these skills and abilities.

4. Administrative Personnel:

For employees in Administrative roles, please choose the level of importance for the items listed below.

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

5. Prepress or Premedia Personnel:

For employees in Prepress/Premedia roles, please choose the level of importance for the items listed below.

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

6. Production Personnel:

For employees in Production roles such as press operators, finishing and binding personnel, or other production functions, please choose the level of importance for the items listed below.

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

7. Customer Service Personnel:

For employees in Customer Service roles, please choose the level of importance for the items listed below

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

8. Management and Sales

For employees in Management and Sales roles, please choose the level of importance for the items listed below.

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

9. Creative Personnel:

For employees in Design, Photography, or Illustration roles, please choose the level of importance for the items listed below.

	Not important	Somewhat important	Important	Extremely important
A. General work habits and skills - positive attitude, organized, self-starter	○	○	○	○
B. Communication skills - communicates clearly and appropriately	○	○	○	○
C. Technical skills - computer and software or machine usage as appropriate for the position	○	○	○	○
D. Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends	○	○	○	○
E. Project Management skills - time management, teamwork, problem solving skills	○	○	○	○

10. Administrative Personnel

For Administrative personnel such as estimators, accountants, and administrative assistants, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

▾	General work habits and skills - positive attitude, organized, self-starter
▾	Communication skills - communicates clearly and appropriately
▾	Technical skills - computer and software or machine usage as appropriate for the position
▾	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
▾	Project Management skills - time management, teamwork, problem solving skills

11. Prepress or Premedia Personnel

For Prepress/Premedia personnel, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

	General work habits and skills - positive attitude, organized, self-starter
	Communication skills - communicates clearly and appropriately
	Technical skills - computer and software or machine usage as appropriate for the position
	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
	Project Management skills - time management, teamwork, problem solving skills

12. Production Personnel

For Production personnel such as press operators, finish and bindery workers, etc., now consider the following examples of skills and characteristics characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

	General work habits and skills - positive attitude, organized, self-starter
	Communication skills - communicates clearly and appropriately
	Technical skills - computer and software or machine usage as appropriate for the position
	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
	Project Management skills - time management, teamwork, problem solving skills

13. Customer Service Personnel

For Customer Service personnel, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

	General work habits and skills - positive attitude, organized, self-starter
	Communication skills - communicates clearly and appropriately
	Technical skills - computer and software or machine usage as appropriate for the position
	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
	Project Management skills - time management, teamwork, problem solving skills

14. Management and Sales Personnel

For Management and Sales personnel, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

	General work habits and skills - positive attitude, organized, self-starter
	Communication skills - communicates clearly and appropriately
	Technical skills - computer and software or machine usage as appropriate for the position
	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
	Project Management skills - time management, teamwork, problem solving skills

15. Creative Personnel

For Design, Photography, and/or Illustration personnel, now consider the following skills and characteristics in terms of which are most important for each type of job position. For each one, choose the numbers 1 thru 5 in the boxes to indicate their importance, with 1 being the most important and 5 being the least important.

	General work habits and skills - positive attitude, organized, self-starter
	Communication skills - communicates clearly and appropriately
	Technical skills - computer and software or machine usage as appropriate for the position
	Graphic Communication knowledge - understanding of the industry overall, familiar with industry standards, guidelines, and/or trends
	Project Management skills - time management, teamwork, problem solving skills

16. If you were hiring, what would you look for in a graphic communications employee? Please add any additional thoughts on necessary skills, knowledge, and/or behaviors.

Section 3: Customer Relations

This section seeks to identify the nature of relationships between graphic communications companies, sometimes referred to as service providers, and their customers.

17. Consider the relationships between your organization and your customers, and how you predict those to be in the next 10 years. With that in mind, please indicate to what extent you agree or disagree with the following statements:

	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	Not sure
In addition to providing bids, the service/print provider will be brought into the marketing process much earlier. They will be considered more of a consultant or partner with their customers, in the role of solving and understanding the needs of their customers.	○	○	○	○	○
Salespeople in the service/print provider organizations will be given access to personnel higher up in the customer organization, often those with more authority for making decisions.	○	○	○	○	○
With the continued reliance on customer databases for variable data marketing, trust and loyalty will be increasingly important between service/print providers and their customers.	○	○	○	○	○

18. How would you describe the relationship that you envision between your organization and your customers over the next 10 years? What changes might take place?

Topics in Graphic Communications Programs

This section seeks to identify the topics that you believe need to be taught in college programs for people going into the printing and visual communication areas.

19. The following topics are taught in many programs that prepare graduates to work in graphic communications, particularly printing and multimedia fields. Please indicate how important you believe each topic is in terms of including teaching it in the program.

	Not important	Somewhat important	Important	Extremely important
Customer service skills	○	○	○	○
Job estimating, planning, & scheduling	○	○	○	○
Supervisory techniques such as managing people & systems	○	○	○	○
Plant organization, management and workflow	○	○	○	○
Project management concepts & software	○	○	○	○
Business Ethics	○	○	○	○
Teamwork	○	○	○	○
Critical thinking skills	○	○	○	○
Quality control systems & devices	○	○	○	○
Sales in graphic communications	○	○	○	○
Trends in digital communication	○	○	○	○
History of printing	○	○	○	○
Computer programming	○	○	○	○
Understanding the concept of Imposition	○	○	○	○
Being able to perform Imposition with software programs	○	○	○	○
Binding – understand the terminology & processes that are used	○	○	○	○
Product fulfillment– understand logistics and physical distribution	○	○	○	○
Color management	○	○	○	○
Spot color and process builds	○	○	○	○
Printing industry standards such as SWOP, GRACoL and G7	○	○	○	○
Variable data marketing	○	○	○	○

PURLs, QR codes, and email blasts	○	○	○	○
Content management and re-purposing	○	○	○	○
Social media marketing	○	○	○	○
Interactive pdfs	○	○	○	○
Publishing for mobile devices	○	○	○	○

Section 4: Basic Demographic Information

This section is for gathering general information about the people who filled out this survey, as well as for the type of company or organization that they are in. The information will be combined for reporting, for example,the data might show that "74 percent of the respondents were from companies with 10-20 employees." No personal or individually identifying information will be reported.

20. The person who filled out this survey is in the following age range:

- 18-21
- 22-29
- 30-39
- 40-49
- 50-59
- 60+

21. What is your gender?

- Female
- Male

22. How many years have you been in the graphic communications industry?

- 0-5
- 6-10
- 11-20
- 20-30
- 31-40
- 40+

23. What is the job title for your current position?

- Owner/Co-owner/President
- Vice President
- Manager
- Human Resources
- Production

Other (please specify)

24. In what year was your organization founded?

25. What is the name of your organization? This information will not be included in the results of the survey, it is strictly for keeping track of the companies which have completed the survey.

26. What is the city and state in which your organization is located?

27. How would you classify your MAIN type of business? Choose 1.

- ○ Commercial printer/Sheetfed
- ○ Digital Printing
- ○ Mailing and Fulfillment
- ○ Forms Printing
- ○ Finishing Services
- ○ Book Printing
- ○ Greeting Cards
- ○ Indoor/Outdoor Signage
- ○ Packaging
- ○ Promotional Products
- ○ Web Press Printing

Other (please specify)

28. What other services does your company provide? Choose all that apply.

- ☐ Commercial printer/Sheetfed
- ☐ Digital Printing
- ☐ Mailing and Fulfillment
- ☐ Forms Printing
- ☐ Finishing Services
- ☐ Book Printing
- ☐ Greeting Cards
- ☐ Indoor/Outdoor Signage
- ☐ Packaging
- ☐ Promotional Products
- ☐ Web Press Printing

Other (please specify)

29. How many full-time employees currently work for your organization?

- 1-10
- 11-30
- 31-50
- 51-75
- 76-100
- 101-150
- 151-200
- 200+

Other (please specify)

30. Would you be willing to be contacted to discuss these questions over the phone? It would take no more than 25-30 minutes of your time. The purpose would be to get additional information and clarification on the data that is received. If you would agree to this, please provide the following information:

Name:

Contact Number (identify office, cell, or home):

Best days and times to call:

Thank you for completing this survey!

APPENDIX C:

SCRIPT FOR PERSONAL TELEPHONE INTERVIEWS

Script For Personal Interviews (After Final Changes Accepted by IRB)

Thank you very much for agreeing to talk with me concerning the graphic communications survey that I sent out. Our conversation will be recorded, just for me to refer to so that I don't miss anything. You are free to speak and remain anonymous. I will not report any specific information about you or your company, unless you volunteer to give me permission. There are no direct benefits nor any compensation for you that would come from participating in this interview. However, your input is extremely important and valued.

Finally, if you have questions about the study or desire information in the future regarding your participation or the study generally, you can contact me at 319-273-2746 or my faculty advisor, Dr. Mohammed Fahmy, at the Department of Technology, University of Northern Iowa 319-273-2758. You can also contact the office of the IRB Administrator, University of Northern Iowa, at 319-273-6148, for answers to questions about rights of research participants and the participant review process.

Again, thank you for your time and knowledge.

1. What can we do as educators to help prepare students to become your future employees?
2. What trends do you see your organization being involved in that future employees will need to be ready for?
3. Do you get many of your employees from 4-year college programs, as opposed to high school, 2-year college programs, or other businesses?
4. There were not enough responses to state any specific trends. Do you have any thoughts as to why business professionals would not respond to a survey such as this?

Thank you very much. Have a great day!

APPENDIX D:

OPEN-END RESPONSES REGARDING FORECASTED TRENDS

1. Certainly the Lando technology could have a dramatic impact on digital print. Continued growth in Smartphone applications that affect print solutions.
2. Need to be able to sell clients turnkey solutions which we create, manage and maintain. Need to offer mores services outside of litho.
3. Looking forward to plateless full format digital offset - either Indigo or ink jet.
4. The acceptance of Augmented Reality applications could have a major impact
5. The number of printers will continue to contract but there will plenty of business for those who adapt to the changing market and expand existing product lines and become full-service partners with their clients
6. Anything that can go digital, will go digital quickly. Anything that can't go digital right now will go digital eventually.
7. Our Senior Management is " betting the house" so to speak on a Storefront approach to print buying. With every emphasis on our own web development and hiring of Database Analysts- traditional positions such as estimating and production management and even customer service will be replaced or evolve into more MIS and Internet centric positions. Sustainability will continue to be valuable and Digital Printing will continue will rise with the introduction of Nando Printing Presses
8. significatn rise in API'S
9. Less on paper, more on phones

10. Ink jet printing is going to play a large role in the future.
11. We are seeing an increase in specialized printing, such as U.V. printing and packaging.
12. Continue to remove touch points.
13. YOU WILL HAVE TO KEEP UP WITH THE TRENDS AND DIVERSIFICATION TO STAY IN BUSINESS
14. conventional offset will shift to digital more color variable and more versioned printing

APPENDIX E:

CUSTOMER RELATIONSHIPS - OPEN-ENDED RESPONSES TO QUESTION 20

1. We strive to provide printing and related services to our customers to keep them satisfied and build long term relationships.
2. Getting tighter with more touch points and greater understanding of customers business.
3. Access must be created... It will not be given...
4. Experience has proven that customers do not want their printers to be their marketing service providers. Printers will take more control of all the digital assets for their customers for multimedia purposing.
5. Sales people must be more competent and offer value added solutions rather than just estimates
6. I don't know that things will change that much between providers and customers. Where salespeople are generally the first line of communication between the two, I think that for the most part the general annoyance and need-to-work-with attitude towards salespeople will remain largely unchanged - if not more strained due to seemingly more aggressive tactics in use.
7. More collaboration at senior levels in client organizations. Fewer vendor partners, greater "mutual importance" between client and vendor.
8. In truth- loyalty only goes to the next purchase order and budget The companies that remain in the next 10 years will be able to offer both old and new media solutions to their customers and provide 'Easy Solutions' to

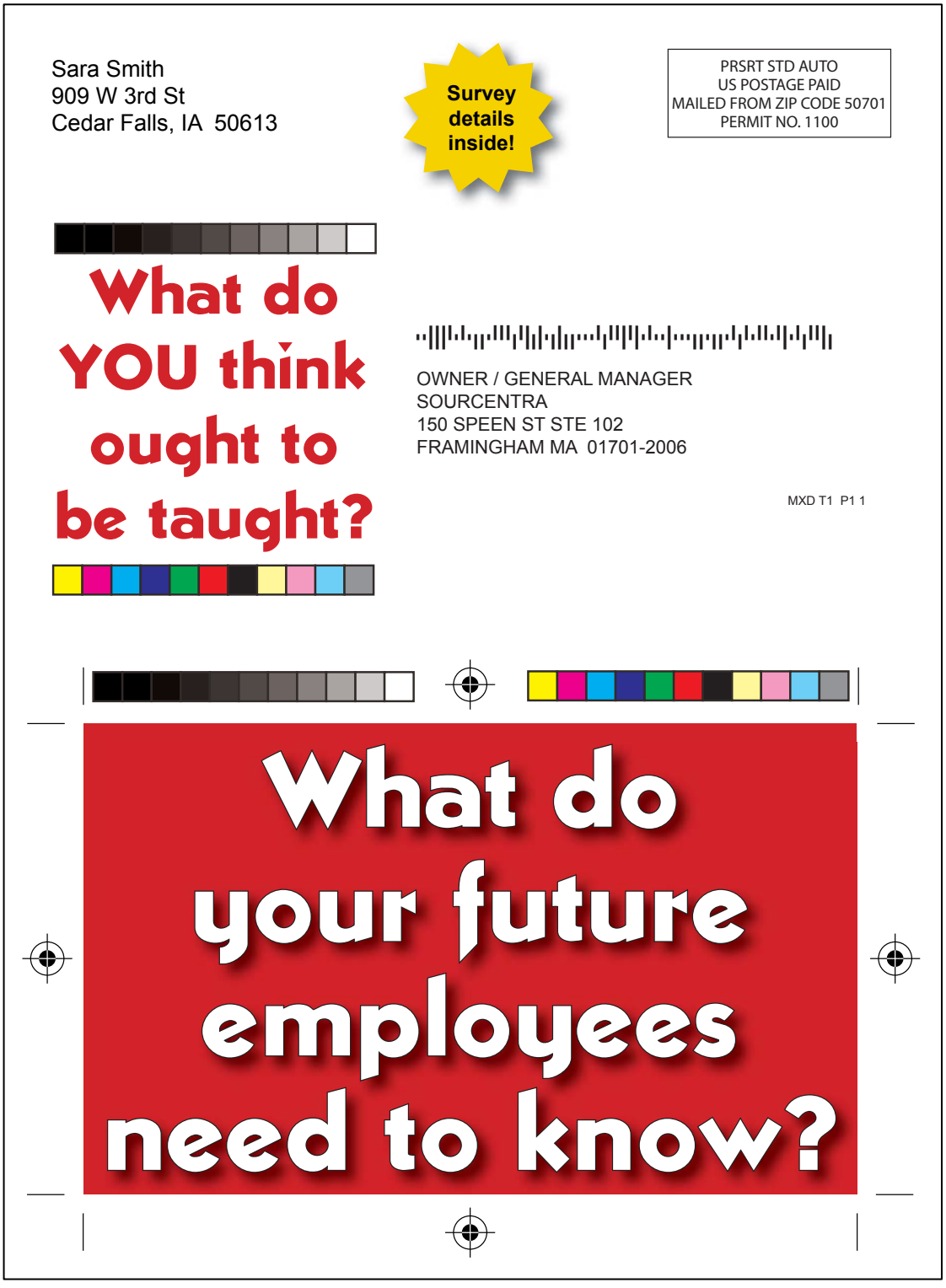
complex requests As mentioned above- we believe that a Storefront approach will be valuable as Customers fall behind in graphic knowledge and only follow dollars Thus, the company has to have solutions to lead and profit

9. there will end up being 2 types of customers. online customers who order cookie cutter products - business cards from a standard template, and then there will be customers who want fancy paper, custom shapes, personalized with variable data.
10. less personal involvement with customer
11. It will continue to get stronger. We have already seen a shift in the last 5 years that will continue to grow.
12. Partnership relationships, with a strong emphasis on the ability to move large amounts of detailed data through the process without errors.
13. The theory that is presented here is valid, however what is equally important is a sales rep. that has been well educated in the process. They can then in turn, educate the customer. Currently, the sales person often times does not support the printing company that they work for, which can make the process far more difficult to achieve good results.
14. must trust us and continue to offer new products and solutions
15. WE GET INVOLVED WITH PROJECTS AT THE PLANNING STAGE TO HELP OUR CUSTOMERS CREATE THE BEST PRODUCT AT REDUCED COST
16. One of trust not slick sales presentations.

17. More transparency, more communication and growing business relationships/partnerships. The industry is going through some growing pains with the economy and emergence of the digital age. Flexibility and adaptability are important and clarity in communication will be especially important to keep all involved parties supported through change so organizations and the individuals running them don't seize up.
18. We are a ' partner ' with our clients to the point of blending with them on concepts to finish projects. We are there from start to finish and beyond, we are almost a part of their staff to a point.
19. Customers will continue to rely more on online ordering as they become more familiar with marketing options.
20. We will have to be more of a "partner" in their projects to not be considered a commodity.
21. More of a Partnership Relationship

APPENDIX F:

INITIAL MAILER FOR SURVEY INVITATION



Side Two of Initial Mailer

Dear Graphics Professional,

You are invited to participate in a research study of "Graphic Communications Industry Trends and Their Impact on the Required Competencies of Personnel," which I'm conducting as part of my doctoral program at the University of Northern Iowa. Your involvement in this study is greatly appreciated!

WHY?

The purpose of this study is to: 1) determine the major industry trends that business owners and managers believe will be most important in the near future; and, 2) identify the skills and competencies that will be most needed by the future workforce of the graphic communications industry.

QUICK & EASY:

The survey is designed in such a way that you can click on responses, rather than entering a great deal of text through typing. The estimated time needed is only 20-30 minutes. Additional information is explained in the opening section of the survey.

To find out more or take the survey online now, you can go to:
https://www.surveymonkey.com/s/GraphCommIndustry

WHAT'S IN IT FOR ME?

While this study will not result in any direct benefit or compensation to you, **your responses may benefit the field of graphic communication by providing an industry professional's viewpoint. Educators could use your ideas to shape curriculum to best prepare the future personnel of the graphic communications industry.** In addition, the results may be made available for you to view when the study is completed.

Finally, if you have questions about the study or desire information in the future regarding your participation or the study generally, you can contact me at sara.smith@uni.edu or 319-242-2405.

THANKS for taking the time to help me with my doctoral dissertation research!

Sara Smith

Faculty Instructor
Graphic Technologies Program
University of Northern Iowa

APPENDIX G:

REMINDER POSTCARD FOR SURVEY INVITATION