Print-production education for graphic designers

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Print-production education for graphic designers

by

Peter D. Jourdan

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

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Program of Study Committee:
Debra Satterfield, Major Professor
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This is to certify that the master’s thesis of

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has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
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ABSTRACT

Institutions teaching graphic design often emphasize concepts and methods of practice that yield excellent design abilities. Too often, however, the teaching of the methods in which those designs are then printed and produced are considered secondary due to a variety of reasons including cost considerations, available technology, and time available within an existing curriculum to teach such topics. Throughout history, changes in printing technology have changed the way designers’ work is produced. What was once a series of steps involving a multitude of professionals able to fill the design-to-print transition is now often directly in the hands of the designer. In essence, digital printing technology has led the designer to become the typesetter, prepress operator, and even the printer. It is important that graphic designers are able to understand the ways in which their work is printed and produced to allow them to take advantage of the variations and possibilities inherent in each of the different printing and output devices.

Lack of communication between designer and printer often leads to less than desirable printed pieces. A lecture course on print production may explain the topics, but fails to give students a hands-on experience in the craft of printing in a manner comparable to the rest of their studio-based education. This study considers the limitations of print-production education at graphic design institutions and considers how print-production methods and techniques can be taught using a variety of teaching and evaluation methods, and how those methods can be better integrated into the curricula at graphic design institutions.

In particular, the study will look at what knowledge is necessary in a course on print production and attempt to validate the importance of that knowledge. It will also evaluate existing resources on the topic. Additional consideration is given to those subjects within the
field students and printing professionals consider common sources of errors. Through the identification of important knowledge areas, resources, and problematic topics, a proposal will be made in an attempt to strengthen print-production education for graphic design students.
CHAPTER 1
INTRODUCTION

With changes in printing and production technologies in recent years, graphic designers have become increasingly responsible for creating print-ready designs. Where professionals once filled a gap between design and print through typesetting and manual layout processes, technology often demands designers send work directly to printers and that those works be prepared for a variety of printing processes. For educators at the college and university level, preparing graphic design students for the workforce with this skill set in mind can be a daunting challenge. The skills of design and print production are not always inclusive. Limited resources and budgets at schools often allow for little in actual produced works, resulting mainly in mock-ups and digital prints. While teaching the fundamentals of design, these mock-ups have little application when it comes to what is produced on a mass scale in the graphic arts industry. The importance of a foundation in print-related production for graphic designers cannot be over-stressed. The benefits of better trained students prepared to enter the workforce with a skill set necessary to get their designs produced need to be considered and developed. Ways of doing this within the limitations of budgetary constraints and the technology available at today’s graphic design education institutions need to be explored.

According the Taz Tally is his book *Electronic Publishing: Avoiding the Output Blues,* “gone forever are the days when we learned one set of skills and used them for a lifetime. Our best preparation for a professional life in communications is to learn thoroughly the fundamental principles of digital imaging, because those will never change. The study we do during our formal schooling days is just the start.” (Tally 2002, 11) Technology and the
graphic arts industry have had a long, symbiotic relationship. As technology changes, the tools available to the graphic designer change, often affecting the way designers work. This, in turn, has historically led to visual and stylistic variations in the works designers produce. Futurist poet-designers in the early twentieth century were able to create active, nonlinear page layouts by using the relatively new technology of photographic reproduction. Tomorrow’s technologies may well yield the next revolution in graphic design. Designers who can understand and use the technology at their disposal, including all nuances of the print-production processes are well poised to evolve to meet the challenges of an ever-changing field.

Educators and institutions that teach graphic design, while not necessarily resistant to increasing the level of print-production instruction, often find it difficult to incorporate into already crowded curricula and budget-sensitive departments. Yet how often have sentiments similar to “begin with the end in mind—and understanding the steps in between—and your design will be successful” (Berlin et al. 2002, 1) been uttered by design instructors? Many of these instructors might mean having the finished design in mind, but employers are concerned with the step beyond that, the finished, printed piece. A strong understanding of the printing process and what is required of the designer will help to give the above sentiment meaning in the professional world.

One reason why finished printed pieces are not to the standards a designer expects is a lack of communication between the designer and printer. This does not suggest that every designer should become a printer, or have an intimate knowledge of how printing works. But designers should be able to successfully communicate with other people involved in the production process in order to ensure a successful outcome. In their book A Guide to Graphic
Print Production, Johansson, Lundberg and Ryberg mention that “mounting a graphic production generally involves numerous different parties that have to cooperate in order for everything to work. The flow of information during the graphic production process can become very complex.” (Johansson, Lundberg, and Ryberg 2003, 262) It is essential that designers are able to communicate with those individuals who will be responsible for the production of their work and that communication begins with an understanding of the processes and terminology common to the industry. A more thorough understanding of the fundamentals of the production process will help to ensure stronger communication and more predictable results.

There are books published every year describing basic principles of printing processes and prepress work. Some of these are even intended as resources for the classroom, with chapter-ending discussion questions and lengthy tips for students. Many of these books are handy resources for design students when a question arises. Few, however, are usable in anything other than a lecture course at an educational institution. Graphic design students spend years in studio learning environments, fulfilling their training in the discipline through hands-on exercises and simulated real-world projects. And yet, when asked to learn about a critical aspect of getting their works produced, they are talked at and asked to read books. While this may work for some, it is not compatible with the learning styles students are accustomed to in the balance of their education. This thesis will look at how a course on print-production techniques can be taught using a variety of teaching and evaluation methods. It will also examine how to better integrate such a course into a university level graphic design education curriculum.
One note on semantics – this thesis uses the term “print production” to mean all the stages of the printing and production process of printed matter. This is taken to mean not just the printing step in the production process, but all steps up to and beyond the actual printing of a piece.

The literature review for this study begins by reviewing how advances in printing technology over the centuries have affected the graphic arts. Special attention is paid to the advent of digital printing technology and the subsequent consequences on the responsibilities of the graphic designer. Understanding the history of printing and how technological changes in the art of printing have changed the way designers work is an important base of knowledge to begin looking at how print-production skills are taught to graphic design students.

The literature review will also look at software solutions on the market today intended to make the designer’s job easier and the transfer from designer to production people go more smoothly. These software products look at a series of constraints in order to determine if a designer’s files are ready for the printing process. It is important to know what these constraints are in order to better gauge what a designer needs to be taught.

Lastly, the literature review will examine books available at time of writing and list their strengths and weaknesses as resources for print-production educators and students.

This study will examine common problems faced by both design students and industry professionals in order to determine which aspects of the print-production process need the most emphasis in a graphic design curriculum. It will analyze student feedback from a survey conducted at the conclusion of a pilot-course on print production to determine which aspects of the course were successful and which aspects need to be changed. Additionally, a survey of working professionals in the printing industry will be conducted and reviewed to
determine which aspects of the printing process cause problems for their customers. The results of a student project in offset lithography will be reviewed to find where errors occurred in preparing a design for the printing process, and finally, a case study in textile design education will be used to compare how textile design and graphic design courses on production are taught. From the results of these assessment tools, suggestions for changes to the pilot-course in undergraduate graphic design print production will be proposed. These proposed changes will be presented in the form of student exercises or projects intended for use in a class on print-production methods for graphic design students at the university level.
CHAPTER 2

LITERATURE REVIEW

This thesis seeks to discover whether there are better ways that college undergraduate design students can be taught the fundamentals of printing and production as related to their field. It is important to consider the literature that already exists on the subject and to determine what areas of the field are currently lacking in development. To this end, numerous books, web sites, and periodicals were examined with content relating to print production.

This literature review includes three areas of research that were determined to be important in how graphic designers interact with printing professionals or how students are taught about production. Those three areas are:

1. A review of the impact of printing technology on the field of design and how the role of the designer has changed in recent years
2. A closer look at software available to simplify the design-to-print gap
3. A review of published books relating to print production.
1. From Gutenberg’s press to direct-to-press: how printing technology influences the practice of graphic design

Dutch graphic designer and design educator, Jan van Toorn, when speaking about his education at the Rietveld Academy in Holland, had the following to say. “I blame my teachers for not giving me a practical professional training. I had to learn everything in practice, and I’m still angry with them. My teachers were very good in liberating people in a cultural sense. But they never offered us the tools to negotiate with the real world.” (Resnick 2000, 39) There has been an almost constant argument in graphic design education between technology and traditional materials and hand skills. At no time has this argument been greater than in the past fifteen years with the maturation of the computer as legitimate design tool. This, however, is merely the extension of a trend dating back almost to the beginnings of what today we call graphic design. Katherine McCoy makes the following point:

Traditional materials, tools, and hand skills are largely irrelevant for today’s typographic education and practice. The computer is a far more powerful learning environment for students and a more effective teaching tool for educators. This assertion will set off many alarms among our best teachers. Disturbing as it sounds, there must also have been considerable consternation when moveable type began to displace the calligraphic pen, since technology has always been related to the forms, processes, and output of communications design. (McCoy 2003, 30)

Technological changes throughout history have had a major impact on how designers work. It has changed the way designs are produced, and as a result changed the way they look. This section of the literature review for this study will look at historical precedents that have been affected by changes in printing technology, leading up to the dramatic changes of printing technology evident in the late 20th and early 21st century with the development and subsequent advancements in digital printing technologies.
In 1950, Yale University was the first university in the United States to offer a degree program in graphic design. Until that time, people who did what today we identify as graphic design were, if trained at all, educated in the fine arts, architecture, or advertising. The reasoning given by Dr. Charles Sawyer, Dean of the College of Fine Arts at Yale was “to disassociate the new program from the existing one in fine art, and to better identify it with architecture.” (Kelly 2001, 3) The program was able to bring in instructors who were or have since become historically famous such as Josef Albers, Alvin Eisenman, and Alvin Lustig. At the beginning, “the principal focus of the program was typography, printing, printing production and book or periodical design.” (Kelly 2001, 8) While studio courses used copy-cameras and wood types to experiment in typography and photography, there seems to have always been an emphasis on the importance of printing. “In conjunction with type, there was extensive involvement with all aspects of printing production, which included lectures and field trips. Graphic design graduates were considerably more knowledgeable about printing production than their counterparts graduating from art schools.” (Kelly 2001, 9) The author does not offer evidence as to whether this advantage in knowledge made graduates directly more qualified for the professional world when leaving Yale, although he does mention that “its graduates were instrumental to establishing the profession of graphic design in the United States during the 1960s.” (Kelly 2001, 3) There is no way to determine whether the expertise of graduates in printing production had anything to do with this trend, although given the emphasis on printing production education in the program, it does seem likely to have been a factor.

In the 1950s and 1960s it would have been vastly easier to instruct students in the craft of printing production. For one, a small offset lithography printing press could have
been added to a school and would have covered most of the printing methods of the day. With this press students could have prepared their designs and made photosensitive plates and printed the works without a prohibitive cost to the department. By the 1980s the expansion of the printing field and related technologies meant that a department would have to invest more heavily to give students the background in printing production. By the 1990s the proliferation of printing technologies would have made it impossible to educate students in the fields of printing production thoroughly while still providing a thorough graphic design education. Certainly, the small offset lithography printing press could have been maintained and used, but the sheer number of different types of printing processes and the introduction of digital printing presses would have made a broad education difficult.

Despite limitations, technological advances in the printing industry have created more opportunities for designers to explore the intricacies of the world of print, provided they have a basic understanding of that world. As Jan van Toorn said, “when I began teaching I thought I would not make the same mistake my teachers made in not preparing the students for practice. I tried to teach people what I had to learn on my own.” (Resnick 2000, 39) The remainder of this section will consider the implications of printing technology advances on design.

a. Gutenberg and the advent of typography

Any study into the origins of graphic design and printing technologies must begin around 1450 in Mainz, Germany with Johann Gutenberg. While printing technologies existed before this, it was Gutenberg’s technological advances that led to the beginnings of what we call typography today. “Typography is the term for printing through the use of independent,
movable, and reusable bits of metal, each of which has a raised letterform on its top.” (Meggs 1998, 58) Gutenberg’s invention of great importance was not the printing press, which, in various renditions of the story was an adapted wine, cheese, or mirror press. It was his incorporation of the use of individual pieces of cast metal type to be used with a press that applied even pressure. With a background as a metalsmith, Gutenberg used a mixture of lead, tin, and antimony to create individual pieces of type. Gutenberg also needed a new form of ink, different than that used on woodblock prints at the time. To this end he developed a more viscous ink suitable for use with cast metal type. The importance of Gutenberg’s development of cast type and its adaptation to the press he modified for the purpose of printing, called the letterpress, cannot be stressed enough. “Gutenberg’s press and system were used for four hundred years with moderate improvements.” (Meggs 1998, 65)

The technological achievements of Gutenberg and the way that widespread printing revolutionized knowledge around Europe at the time are well documented elsewhere. As Meggs states, “typographic printing allowed the economical and multiple production of alphabet communication. Knowledge spread rapidly and literacy increased as a result of this remarkable invention.” (Meggs 1998, 58) This is the beginnings of the intermingling of what would much later become known as graphic design and its symbiotic relationship to printing technologies.

b. Lithography

In 1796, Aloys Senefelder invented lithography in Germany. The term lithography means quite literally, “stone writing” from Greek. This would become perhaps the second
most important printing development after cast type and one hundred fifty years later would
become the dominant form of printing.

Lithography is based on the idea that oil and water do not mix, a basic principle of
chemistry. Meggs describes the process as follows:

An image is drawn on a flat stone surface with an oil-based crayon, pen, or
pencil. Water is spread over the stone to moisten all areas except the oil-based
image, which repels the water. Then oil-based ink is rolled over the stone,
adhering to the image but not to the wet areas of the stone. A sheet of paper is
placed over the image and a printing press is used to transfer the inked image
onto the paper. (Meggs 1998, 146)

The obvious disadvantage of lithography at the time of its invention was that any imagery
drawn on the stone had to be drawn in reverse in order for it to appear right-reading on the
resulting print. Writing on the stone backwards was challenging in creating typography, in
particular. In addition, the quality of the stone as well as the detail afforded by the oil-based
pencil would limit the detail of any typography. The advantage to lithography was that the
artist could draw directly onto the stone rather quickly, rather than engaging in a lengthy
engraving process in copperplate or wood. Later, Senefelder experimented with zinc metal
plates which he found “behaved much like the stones he was studying.” (Romano 1998, 13)

In 1796, lithography was a technology that didn’t provide much in the way of practical
reality, but the technology would become important in the future.

Nearly one hundred years later, in 1895, the craft of lithography was advanced
through the invention of offset printing. An American named Ira Rubel noticed that images
that printed onto an intermediate rubber blanket could then be printed onto paper. “The
process of offsetting the image to an intermediate transfer surface results in prints with a
softer tone than those achievable with direct lithography.” (Greenwald and Luttropp 2001, 5)
This was an important discovery as it allowed the person preparing the plates to use right-reading, or positive plates as opposed to the negative plates used in the lithography in the previous one hundred years. Finally, a printer could prepare a single plate exactly as they wanted it to appear by writing directly onto the plate’s surface. Advances in photographic processes would eventually make this into the dominant form of printing technology.

Experiments were also done with integrating color into lithographic prints during the nineteenth century. Called chromolithography, this process used the idea that color could be separated and printed in succeeding press runs. “The arrival of color printing had vast social and economic ramifications.” (Meggs 1998, 147)

c. Printing advances in the nineteenth century

While lithography was developing throughout the 1800s, there were other advances in printing and typesetting technology taking place at the same time. The 1800s marked the century of the industrial revolution, and as such had countless technological breakthroughs. This section of this study will focus on the three major developments: the increase in printed material through faster printing presses, the typographical liberty wood-type letters afforded, and the increased ease of typesetting through automated typesetting machines invented towards the end of the century.

The first half of the nineteenth century is marked by an explosion in printing press technologies. At the beginning of the century, presses were made of wood, with some metal parts, and would have been very similar to the press Gutenberg used three hundred and fifty years before. Early developments included a printing press made entirely of iron allowing for greater and more uniform pressure. At the same time a new type of printing plate, called the
stereotype was being developed as a single, all-metal plate combining text and illustrations. Steam power was added to printing presses speeding the printing process by over four times. The steam-powered press “caused the speed of printing to skyrocket while its price dropped considerably.” (Meggs 1998, 132)

Printing speed was further improved upon when steam power was added to a rotary press, and again later with the development of the first web press in 1865, which printed on a continuous roll of paper and was capable of perfecting, or printing on both sides of the paper on the same run through the press.

All of these improvements in printing press technology meant faster presses and lower costs per print which helped in the spread of printed matter. In addition, Meggs makes the point that the nineteenth century marked the end of the period of design and production unity. The printer was no longer involved in every stage of the process, but became involved specifically in the printing. “Over the course of the nineteenth century, however, the specialization of the factory system fractured graphic communications into separate design and production components. The nature of visual information was profoundly changed.” (Meggs 1998, 127)

While printing presses and processes were improving, the way type was being set was changing as well. Darius Wells’ invention of the lateral router in 1827 allowed wood letters to be mass produced. This allowed for very large, display-sized letters which were expensive and heavy when cast from metal. Wood-type caused an explosion in poster and handbill printing, many of which featured type that was displayed for the first time, with large letters and also a combination of condensed and extended type on the same poster. The easy-to-construct wood-type letters also led to an enormous variety of fonts, allowing more choices
for typesetters to consider when designing a poster. While there were not graphic designers at the time, Meggs makes a claim as to how design decisions were made.

Design decisions were pragmatic. Long words or copy dictated condensed type, and short words or copy were set in expanded fonts. Important words were given emphasis through the use of the largest available type sizes. There was a practical side to the extensive mixing of styles in job printing, because many fonts, each having a limited number of characters, were available in the typical print shop. (Meggs 1998, 131)

The advances in printing technology and typefaces available helped to change the way type was used at the time.

A third of many great advances in the nineteenth century was the development of machines capable of casting metal type. Setting individual letters by hand to compose a page was a slow process. People around the world were working to create a machine that could automate this process.

The first truly useful machine of this sort was the Linotype machine, invented by Ottmar Mergenthaler in the 1886. Mergenthaler’s machine worked by placing individual molds, called matrices, into a line when an operator struck a key similar to on a typewriter. When a full line of type was set, molten lead was poured into the molds to create a full line of cast type. This revolution in typesetting speed led to an increase in publications at the time.

Around the same time, an American named Tolbert Langston developed the Monotype machine. Patented in 1887, the Monotype was similar to the Linotype in that it automated typesetting by casting type as needed. The difference between the two was that the Monotype machine would cast individual letters, not lines of type, at one time, which would then be inserted into a wooden frame. Initially, the Monotype was slower than the Linotype
machine, but had the advantage that if a correction needed to be made, the entire line of type wouldn’t need to be recast.

Meggs sums up the nineteenth century printing and typesetting technological advances as follows:

> Technological advances permitted machine-set typography to be printed on machine-manufactured paper with high-speed steam-powered printing presses. This opened a new era of knowledge, education, and expanding literacy. There was a global spread of words and pictures, and the age of mass communication arrived. (Meggs 1998, 134)

**d. Photography and printing**

As printing was getting new technologies to help it mature as an industry, photography was undergoing technological advances of its own. The two would eventually come together to further develop printing technology, and in doing so would change the way in which photographs are reproduced.

While the efforts to combine printing and photography are many and date from virtually the invention of photography, there are several notable technologies that helped to advance the craft of printing. The halftone screen, invented in 1857 and improved on in the 1880s was the first major development in the science of printing photographs. The halftone process operated under the principle that a series of dots can represent a continuous tone photograph. This was an important breakthrough and one that would be used as the basis for printing for that century and beyond. Halftones also sped up the process of printing images, “up to a week had been required to prepare a complex wood engraving; the photographic process reduced the time from art to printing plate to one or two hours, with greatly reduced costs.” (Meggs 1998, 141)
It was in the twentieth century that photography and printing truly began to combine, however. With the invention of offset printing, craftsmen responsible for composition could provide a camera-ready mechanical that could be made into a printing plate and printed. Photography allowed these mechanicals to be reproduced easily and exactly, which in turn allowed the designers the most freedom they had ever had as far as how type and image were incorporated unto a page. Suddenly, and for the first time, a designer could submit a composition and have it photographed to create a plate directly, rather than work around the process with a variety of type designers and other specialists.

By the 1940s, when offset lithography replaced letterpress as the dominant form of printing in the world, phototypesetters had gained prominence. These machines were similar to the Monotype machine, except that film matrices replaced metal molds and a camera replaced the molten lead. Phototypesetting stored a selection of fonts on film and allowed type to be expanded, condensed, or warped in a variety of ways.

Phototypesetting continued to evolve for the next thirty years or so, driven by the combination of photography and increasingly available digital devices. By 1980, the use of direct-entry phototypesetting devices had increased production speed from around 16 lines of type per minute that was attainable prior to the direct-entry devices up to fifty lines per minute with direct-entry devices. (Gottschall 1981, 143) At the beginning of the decade technology was advancing to help speed production. It was that decade, however, that changed everything in the print world.
e. The digital age of printing

As electronics and other technologies increased in sophistication and abundance during the twentieth century, they were gradually incorporated into the printing industry reaching a culmination in the last decade of the century. At first, electronics were added to printing presses to control speed, registration, and other factors. At the same time, computers were being introduced to the field of typography and helped to create more modern, efficient typesetting machines.

By the late 1970s and early 1980s, computer technology had evolved enough that it began to change the way the printing industry worked. Meggs summarizes these changes as follows:

After phototype became prevalent during the 1960s, skilled specialists included graphic designers, who created page layouts; typesetters, who operated text and display typesetting equipment; production artists, who pasted all the elements into position on boards; camera operators, who made photographic negatives of the paste-ups, art, and photographs; strippers, who assembled these negatives together; platemakers, who prepared the printing plates; and press operators, who ran the printing presses. By the 1990s digital technology enabled one person operating a desktop computer to operate most—or even all—of these functions in one process. (Meggs 1998, 455)

In 1984, Apple Computer, Inc. introduced the Macintosh computer to the world. In the following years this would revolutionize the way designers worked, giving them a new tool with which to ply their trade. The laser printer, introduced around the same time, allowed people to create what was labeled as “desktop publishing.” The impact of the personal computer and the laser printer has been well covered in countless other places and will not be covered in great depth in this study.

Postscript technology was really the driving force behind desktop publishing and would become the primary force in digital printing later. “Postscript is not only a
standardized page description language that can create a rasterized page from commands, photos, and text, but it is also a programming language.” (Limburg 1995, 25) By convincing major computer manufacturers like Apple, Hewlett-Packard, and IBM that Postscript was an important technology, its creators, a company called Adobe, ensured its survival and relevance as a printing technology. Postscript was incorporated into almost all digital printing devices in the ensuing decade.

The first digital printing presses were introduced to the market in 1994. This was only ten years after the Apple Macintosh helped to create the field that became known as desktop publishing. The ten years after 1994 brought digital printing into the forefront of printing technology. It is those ten years that are the focus of this section.

Digital printing has changed the way designers deal with the printing process. There are a wide variety of digital printing technologies, and when we say “digital printing” we can mean many things. A good definition of the term is “all digital printing technologies have one thing in common — they produce a printed image directly from a digital file.” (Romano 2001, 14)

The shift from film and camera-ready platemaking techniques to a digital workflow took much of the 1990s to come to fruition, but by the early twenty-first century, many printers had made that shift. It was not a minor one. “Fully digital printing is a technological shift at least as dramatic in its commercial and cultural implications as the shift from letterpress to lithography, and in some respects even more dramatic.” (Dunn, Hester, and Readman 2001, 109) Digital printing had arrived, as forecast in the early 1990s. “By the end of 2003, just over 50,000 digital color printers had been shipped around the world.” (Romano 2003, 26) Digital printing offers advantages that traditional offset lithography cannot. Most
prominent of these is variable data printing, in which each impression contains different, targeted information. This is impossible on a printing press with set plates. “Variable data printing, personalized for individual recipients, has advanced from an experimental to a more mature technology, albeit more slowly than enthusiastic experts predicted.” (Schmidt 2000, 113) Personalized, on-demand printing is expected to grow greatly in the immediate future. What was once the idea of inserting the recipient’s name or address into a form now allows for targeted pictures and a wealth of information to make marketing more direct and personal.

The effect of digital printing on graphic design is an important one to consider. Designers need to learn to deal with a new set of rules regarding how their works are produced. Graphic designers today are more responsible than ever for the production of their designs. “Graphic design not only has to negotiate new and emerging technologies; it also has to address the relationships formed with and through these new technologies from the perspective of the designer, the printer, the client, and the user.” (Kalantzis 2001, 59)

Indeed, graphic designers today are not the specialized tradesmen they were twenty years ago, they are the designer and the printer rolled into one, in many cases. As recently as ten years ago this was still debatable. Consider this example from 1994:

Cosmo [Demaglie, a sales representative for a photo-typesetting supplier] and others like him are nervous. And they should be, because computers are enabling designers to become typesetters, something he says many of them do and for which most are not qualified. “Typesetting is not the same thing as typing. It’s an art, and it requires a high level of skill and intuition.” Nonetheless, typesetting companies are facing a situation that requires them either to go out of business or to adapt, expensively, by becoming output houses for computer-related services. (Kidd 1994, 43)
You won’t find too many people today who don’t consider typesetting to be a function of the graphic designer. Just like designers and graphic arts companies had to adapt to a digital world ten years ago, printing companies are finding themselves challenged in a world of electronic distribution and are discovering that they too need to adapt in order to stay in business. In 1990 there were 43,720 printing firms in the United States, employing 1,450,000 people. By 2010, one estimate is that there will be 25,700 printing firms employing just 850,000 people. (Romano 2003, 27) This downsizing is largely a result of expanded digital operations.

Examples abound regarding the changing role of the graphic designer. Five years ago no graphic designer had heard of a technology called JDF, for Job Definition Format, because the technology didn’t exist. Today JDF is a hot issue that strives to change the way the entire printing industry works, from the design stage to beyond the final product. Here’s the formal summary of JDF:

Job Definition Format (JDF), an open standard, is designed to simplify information exchange between different applications and systems, improving productivity both upstream and down. JDF facilitates a seamless, end-to-end workflow based on open systems integration, linking information and production as an integral part of the distributed workflow. (CIP4 2004)

More succinctly put, “JDF is getting machines and systems to talk to each other in a more efficient manner.” (Romano 2004) Graphic designers will need to be aware of emergent technologies like JDF because if and when those technologies become a standard, designers will work with their digital printers and be expected to provide JDF-compliant designs. The benefit is a more streamlined digital workflow potentially increasing efficiency and lowering costs. The disadvantage is yet another technology designers will need to be fluent in.
It’s not just new technologies that threaten the way graphic designers work. Today there are literally thousands of digital printers in production throughout the world. Designers use them daily to produce their work. Digital printers may be the proofing mechanism designers use before sending a job to be printed on an offset press. The differences between digital printers and ink-on-paper offset technologies require designers to reconsider the way they work in some cases. Figure 1 below is a summary of considerations for designers using digital printing.

**FIGURE 1:**
The Top Three Considerations in Designing for Digital Printing
(Source: Romano 2001, 24)

**Vignettes, blends, gradients**
In digital printing using toner, one color blending is a source of constant headaches. Today’s illustration and layout programs make it easy to create a blend on screen, and they always look great on the screen, but digital printers often reproduce them with a series of bars, or banding, because of their resolution. By controlling the amount of the blend over a series of space a designer can minimize the effects of banding.

**Smooth Blend**

**Banding**

**Toner coverage and dot gain**
Dot gain occurs on traditional offset presses for a variety of reasons, particularly ink spread on paper. As a result, most designers compensate for dot gain in their photo imaging software. Because toner does spread as ink does, different settings need to be considered when editing images for digital printing.

**Paper Issues**
Toner generally adheres better to smoother papers, so the designer’s choice is somewhat limited when using digital printing. Bleeds are also an issue with digital printing because many digital printers have a non-print margin of around .25 inches.
There are certainly other differences in designing for digital printing as well. Some of these, such as using a rich black, watching solid colors over folds, and using different screening technologies for the printing of images are something that the designer will learn quickly with experience. Advantages such as larger print sizes available on digital printers have helped to spread digital printing. If all else fails, designers need to consult their print shop for details. One of the reasons for this study is to help alleviate some of that consultation and make designers better prepared for different processes without constantly having to discuss plans with their printer. The following quotation is a good summary for designers using digital printing: “knowing what design elements work best on a digital press helps you streamline the printing process and avoid last-minute corrections. In general, documents for digital printing should use flexible and fairly simple designs that don’t require tight registration, exact color matching, or precise front-to-back page alignment. Always consult the print shop for recommendations on specific designs, images, or application settings.” (Shuster 1996, 12)

Digital printing technologies will likely continue to affect the way graphic designers have their works produced. In some instances this will be for the better, allowing designers to create more customized content or produce works that were unrealistic to produce in the past. Each day more printing companies adapt new digital technologies, meaning a new knowledge-base is necessary for designers – “it’s no longer a case of should they get into digital printing, it’s a matter of which one.” (Romano 2004) The economies of scale in digital printing mean that there is no disadvantage to shorter print run lengths. “Printing cultural content can occur at any run length. Long runs have no particular advantage over short runs; niche markets are no less viable than mass markets. Fully digital or variable print does not
bias mass cultures over niche cultures.” (Dunn, Hester, and Readman 2001, 109) New opportunities in the print world mean new opportunities for the designer. Being able to take advantage of these opportunities requires graphic designers who are able to understand and harness the technologies driving them.

2. Looking at Constraints in MarkzWare FlightCheck software

One of the first steps a printing company goes through after accepting electronic files from a client or designer is to run the files through a process called preflighting. Preflight, by definition is “the process of opening a completed document before image assembly to see if it will work.” (Bergsland 1997, 435) Preflighting can be done in a variety of ways. One way is for a prepress operator to open the files and manually check them. This can be a time consuming process as a typical job can contain hundreds of supporting electronic files.

Another way preflighting can be accomplished is through a variety of software solutions created specifically to check client files. The industry standard application for preflighting at this time is FlightCheck from MarkzWare Software. FlightCheck scans files based on a number of constraints, which MarkzWare calls Ground Controls to check for common problems in the electronic files. This check is not an answer to all problems that will occur during the prepress workflow, but it is a good first look at the files submitted and can quickly identify common errors in those files that might otherwise occupy a prepress operator’s time.

According to MarkzWare’s web site:

FlightCheck Professional is the award-winning prepress application that sets the standard for preflighting. This advanced, stand-alone solution has saved the printing industry millions of dollars in reprocessing costs. FlightCheck
Professional scans a wide variety of file types including QuarkXPress, PageMaker, Illustrator, Photoshop, InDesign, FreeHand, CorelDRAW and PDF by using a simple drag and drop interface to warn you of over 150 potential problems, easily and automatically. Documents on a computer screen will not reveal hidden problems such as incompatible graphic elements or font types. FlightCheck Professional investigates native document files even without the application that created it, avoiding the "eyeball method" of evaluation. (Anonymous 2004)

Essentially, FlightCheck provides an easy way of gauging the print-readiness of client files without a large time investment by the prepress operators. The 150 potential problems, or Ground Controls, form a basic list of what can go wrong with a print job. They will be considered further to determine which of these are most relevant for discussion in graphic design education.

With so many Ground Controls to check, FlightCheck, by its very nature, errs on the side of caution. Many of the errors it flags are not errors at all, but simply factors within a design that fall outside of the set parameters. It’s not necessarily an easy tool to use, but it can quickly give access to a wide range of information about a designer’s electronic files.

While there are 150 or more constraints available for testing, these can be broken down into broader categories. A list of these categories and their primary constraints are shown in Table 1, below.

**TABLE 1:**
FlightCheck Ground Controls

<table>
<thead>
<tr>
<th>Category</th>
<th>Primary Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Info</td>
<td>Version, Date, File size, Application that created the file</td>
</tr>
<tr>
<td>Page Info</td>
<td>Page size, Number of pages</td>
</tr>
<tr>
<td>Print Info</td>
<td>Resolution, Line screen, Bleeds</td>
</tr>
<tr>
<td>Page List</td>
<td>Number of colors, Fonts, Images, Page size</td>
</tr>
<tr>
<td>Colors</td>
<td>Color name, Spot/process colors, Color model, Color build, Screen angle</td>
</tr>
<tr>
<td>Fonts</td>
<td>Font name, Printer font name, Style, Font type</td>
</tr>
<tr>
<td>Images</td>
<td>Image name, Status, Graphic format, Mode, Dots-per-inch, Scaling, Resolution</td>
</tr>
</tbody>
</table>
When a prepress operator runs a designer’s job through FlightCheck, it will generate a report summary showing information on each of the primary constraints. From this summary, an experienced prepress operator can gauge approximately how much time will be needed for preparing those files for the printing process. More information about each of these constraints follows. Preflighting is a skill that is relatively new to the printing world, and is specific to computer software and hardware used. Prior to the early 1990s, there was no need for a preflight step in the job workflow, but today it has become essential. While it adds an additional step, the goal is to reduce time spent fixing problems later on in the workflow. According to Frank Romano, “Preflight checking attempts to avoid problems by fixing them up front.” (Romano 1998, 385)

a. File Info

File Info gives basic information about the designer’s page layout file. The application that created the file and the version of that application are listed. It also lists the creation date and most recent modification dates of the files and the digital size of that file in kilobytes. None of this information is anything that the prepress operator can’t get easily in other ways, but it creates a handy summary of those details and keeps it all in one place.

b. Page Info

Page Info lists the each page’s size within a document as well as number of pages within the document. This allows the prepress operator to verify that the file matches written specifications. This information can be particularly useful for jobs that have different sized pages throughout a single document.
c. Print Info

Print Info allows a prepress operator to verify that the print settings are accurate for a specific output device. These settings are important to ensure correct output. Print settings are important later in the job process.

d. Page List

Page List gives a prepress operator a quick look into the what each page of a document contains, including how many colors are in use, how many fonts are used, the number of images placed on each page, as well as the size of each page and whether the page has bleeds or not.

e. Color

Color reports on each color used in the document. This tells the color name and whether the color is specified as a spot, or as a built (process) color. In addition, the model (CMYK, RGB, or PANTONE, among others) is an important constraint the prepress operator needs to know. Finally, the CMYK build for each color is listed, so the color build can be verified to make certain it matches specifications for the job.

f. Fonts

Fonts can quickly tell a user whether a font used is a Type 1 or TrueType font, and whether a style (such as bold or italic) is applied to a font. Styles can be problematic at print time.
Images

Images identifies stored and linked images, as well as the type of image used and the image mode. RGB images are always problems in jobs that need to be printed using CMYK inks, and FlightCheck immediately alerts a user to any RGB images. Of equal importance, the resolution of each image is clearly shown so users can identify images that are too high or too low in resolution.

FlightCheck is a useful tool. It is a tool that must be used carefully and not be overly relied upon as it unnecessarily flags many problems that might not be critical to the chosen output workflow. It also doesn’t solve any problems – it merely helps to identify them. In essence the process of preflighting will identify problems, and then move on to a stage where those problems are solved. In FlightCheck (and other similar software solutions) a product exists to help smooth this process. In FlightCheck we are also able to identify some of the common problems that software (and people) need to look for and solve in order for a job to proceed through the printing process more smoothly. These common problems are important enough, or perhaps critical enough to the printing process, that an entire industry of software applications has developed around them. While some of them may be minor problems, these problems and constraints are all ones that can cause delays, additional expense, and poor results if not considered during the design stage. It is through the identification of these constraints that we can begin to form a foundation for a course in print production.
3. A review of published books relating to print production.

Based on the review of the FlightCheck software and from experience gained in teaching a pilot course on the topic of print production for graphic designers, it is possible to break the topic down into various categories of information and begin putting together a resource of published works on the subject. To that end, twelve books were reviewed and broken down into sections in which they fit in a pilot course. Eight broad topics were selected based on their relevance, and in this chapter those twelve books will be reviewed under each of the topics. The eight topics are as follows:

   a. The History of Graphic Communications and Technology
   b. Planning the Print Job
   c. Using Type and Fonts
   d. Digitizing Data: Color, Scanning, and Photography
   e. Prepress
   f. Offset and Other Printing Methods
   g. Paper and Ink
   h. Finishing and Binding

These topics were generalized and selected based on the FlightCheck ground controls as well as some additional topics necessary in the printing process not covered by FlightCheck such as finishing and binding, which are postpress processes not reviewed by the FlightCheck software but still important pieces of any print job.

The twelve books chosen for review represent some of the best resources on the subject of print production available at the time of writing. The list is certainly not
comprehensive, but does provide a broad spectrum of works from which to gather a variety of resources on the topic. The twelve books reviewed are listed below.

1. *Getting It Printed* by Mark Beach and Eric Kenly, published in 1999 by North Light Books. A classic guide to each step of the design-to-print processes, this book borders on the simplistic making it a good resource for beginning design students, but often fails to offer a more comprehensive look at the more complex aspects of the production cycle.

2. *The Designer's Prepress Companion*, written by Jessica Berlin, Christina Kim, and Jennifer Talcott with Frank J. Romano. Published by the National Association for Printing Leadership in 2002. This book is promoted as a desk reference guide for designers covering considerations in designing for print. Somewhat technical, it is a good overview of the prepress processes.

3. *Alleviating Prepress Anxiety: How to Manage Your Print Projects for Savings, Schedule, and Quality* by Ann Goodheart and published by Leaping Antelope Productions in 2000. A relatively simple book covering all aspects of the prepress process. While most of these aspects are not covered in great detail, a broad range of topics is covered in an easy to follow manner.

4. *Graphic Design and Production Technology*, by Martin L. Greenwald and John C. Luttropp. Published by Prentice Hall in 2001. A book intended for students in visual arts, this somewhat dated text does a good job of presenting the material in a manner promoting problem-solving. The material covered focuses on the design process first and foremost, with the more technical, production topics presented later in a manner relating them directly to the design process.
5. *A Guide to Graphic Print Production* by Kaj Johansson, Peter Lundberg, and Robert Ryberg. Published by John Wiley and Sons in 2003. Perhaps the most comprehensive book on printing and prepress published to date, this book does a good job of covering all aspects of the production process without getting too tiresome in details and technical problems.

6. *Professional Photoshop: The Classic Guide to Color Correction* by Dan Margulis and published by John Wiley and Sons in 2001. This book was chosen from a wide variety of books covering color correction and how to get images looking their best for print based on its complexity and the comprehensive coverage it provides for all color issues.

7. *Designer’s Guide to Print Production* by Kayanna Pace. Published in 2002 by Prentice Hall. This short book compresses the design and printing processes into just one hundred pages. It covers nothing in great detail, but does provide a simplified approach to learning the different processes.

8. *Professional Prepress, Printing, and Publishing* by Frank J. Romano. Published by Prentice Hall in 1999. While being relatively dated, the enormous tome of over 600 pages provides more in-depth knowledge than any designer would ever need. While it covers virtually every step of the process from design to printed piece in great detail, it often becomes too technically written to maintain the average designer’s interest.

9. *Pocket Guide to Digital Prepress* by Frank J. Romano, published in 1996 by Delmar. Another somewhat dated reference, this book is still valid because many of the topics covered have not changed greatly in the years since its publication. It is more relevant to prepress operators than to designers, but as a quick reference it can give a designer
a wealth of information on many of the more complex prepress topics. Like other works by Romano, this book tends to get technical fast, but it is written in an easy to follow format.

10. *Great Production by Design* by Constance Sidles and published in 1998 by North Light Books. This book is intended for designers who have had problems at the printing stage. It is easy to follow and simplifies the process greatly without going into depth in the technical end of things.

11. *Electronic Publishing: Avoiding the Output Blues* by Taz Tally. Published by Prentice Hall in 2002. Intended as a classroom textbook, this book is a comprehensive overview of the design to print processes, but in many cases is simplified to the point of being less than useful.


Each of the eight topics are discussed below, showing where the above twelve books are strong resources on particular topics.

Another facet this section of the literature review considers is whether any of the above books can be used as a comprehensive textbook for a course on print production. The end of this section will summarize each book's strengths and weaknesses in order to help determine whether any of the books surveyed qualify. Certain qualifications to consider are whether such a book is thorough enough, has the right combination of complexity and ease of use, and whether or not any of the above books provide resources for educators.
a. The History of Graphic Communications and Technology

The historical impact of printing technologies was demonstrated at the beginning of this literature review. Few of the twelve reviewed books cover this topic in any detail. In fact the first section of this literature review provides a much better summary of the history of printing technology than offered by any of the books reviewed. Only Romano’s *Professional Prepress, Printing, and Publishing* and Greenwald and Lutropp’s *Graphic Design and Production Technology* provide historical sections. Romano’s synopsis covers communication from the time of the caveman through 1999. While somewhat humorously written, there is simply too much history to cover in twenty-one pages. Greenwald and Lutropp’s book devotes chapter two to historical developments in printing. While it is a short chapter, it does do a good job of encouraging readers to understand modern day communications technology in historical context and provides a handy timeline of graphic communication dating from 15,000 BC cave paintings through to the date of publication. Any course on print production that wishes to teach about the historical impact of printing technology on design will need to go further than these twelve books and consider books on printing history to thoroughly cover this subject.

b. Planning the Job

Often times, novice designers begin to design a product without considerations as to how the job will be produced. This can lead to multiple problems when it comes time to get the job printed. Most books on printing cover this topic in some detail. *How to Plan Printing* is a good resource for this, as the entire (albeit short) book deals with exactly this topic. While it does provide some timeless concepts on topics such as typesetting and designing for
a particular binding style, its 1988 publication date means it does not cover any topics relating to digital printing, a required topic in today’s print production knowledge set.  

*The Designer’s Prepress Companion* spends the first four pages discussing the importance of planning your designs with the production process in mind. Most of the information coverage is at too basic a level for college-trained designers and it ends with the easy way out for any book by saying “don’t hesitate to discuss some of your ideas with your printer.” (Berlin et al. 2002, 4) The entire point of a course on print production is to reduce the amount of problems that the printer needs to resolve, and while talking to your printer is always a good idea, any book that uses this as a way out is failing in its duties to educate its audience.  

In her book, *Designer’s Guide to Print Production*, Kayanna Pace says “sometimes it’s exciting to take a trip without plans or a road map, go wherever road leads, and experience whatever presents itself. Although that may be fun for a road trip, setting up a production file becomes traumatic for all concerned without a plan or map.” (Pace 2002, 1) She goes on to break the process into five stages, planning, design, prepress, presswork, and postpress and summaries the importance of planning for each of these stages in the pages that follow. Pace also includes a sample production ticket as an example to be considered when planning a job, a good checklist for any designer to consider.  

*Alleviating Prepress Anxiety: How to Manage Your Print Projects for Savings, Schedule, and Quality* spends two chapters discussing how to plan your print job. The author discusses the importance of the audience your message will reach when planning for production. In what may seem obvious, the first paragraph of the first chapter stresses that “careful planning translates into saved time, money, and, eventually, your overall
effectiveness in print.” (Goodheart 2000, 1) One of the things Goodheart does in her chapters on planning the job that isn’t done elsewhere is to include a simple, graphical flowchart emphasizing the various steps a design will go through on its way to becoming a printed product. In this flowchart, Goodheart encourages designers to “include a time chart showing the schedule for writing, editing, designing, printing and mailing.” (Goodheart 2000, 11)

In *Graphic Design and Production Technology*, Greenwald and Lutropp spend chapter four discussing the design process. There is nothing new here as far as design students should be concerned, but there is an emphasis on understanding production methods while in the conceptualizing phase of the design process. In chapter five they discuss how to find the right printer for your job, including how to use a specifications sheet to help as a checklist for production needs.

*A Guide to Graphic Print Production* by Johansson, Lundberg, and Ryberg breaks the planning process up into distinctive steps. This is different from what every other book does. They identify nine steps of the graphic production process. The first two phases are what they call the idea stage, and encompass the strategic phase and the creative phase, or the conceptual part of any design job. The third and fourth phases are the creative production stage, or the actual designing of the job, including the production of originals and production of images phases. The last five phases are the industrial production stages, and are the phases that occur after the job has left the designer and has been received by the printer. In the first chapter of their book, the authors state that “a fundamental truth of graphic production is that in order to make the best design and material choices in the initial phases, you must understand the options available to you in all subsequent phases of production. This means thinking about the project in reverse.” (Johansson, Lundberg, and Ryberg 2003, 9)
Getting It Printed, by Beach and Kenly, devotes the first chapter to planning for results. While a good attempt at summarizing the planning stages, it glosses over the process too quickly and says little of importance, generalizing and providing little beyond common sense tips.

c. Using Type and Fonts

Nearly every book ever written devoted to the craft of printing and production for graphic designers deals with the issue of using type and how fonts work on a computer. There is a good reason for this, as this is a common source of problems when jobs go to the printer. Most books cover the basics such as different types of computer fonts and their applications as well as fundamentals such as point size, leading, column width, etc. This section will focus on what makes references to type and fonts in the twelve reviewed books valuable to design students.

Ann Goodheart’s Alleviating Prepress Anxiety: How to Manage Your Print Projects for Savings, Schedule, and Quality devotes chapter three to type and design. Most of the topics covered are just the basics of typography such as point size and proofreading symbols. This book does contain several of what it calls “war stories,” that is, real-world scenarios in which things have gone wrong and what was done to fix the problems.

Chapters fifteen and sixteen of Designer’s Prepress Companion cover the use of fonts and type. This book does a good job of covering how printers and output devices interpret fonts from a designer’s files, and deals with the technical aspects of different types of fonts. It also has a section on problems with fonts, beginning that section with the statement “it would seem reasonable to expect that if it prints on your desktop printer, it will print just as
well on a commercial press. The following are important reasons why this is not the case.” (Berlin et al. 2002, 104) The problems outlined are all common output problems with type and are a must read for any designer.

*Getting It Printed,* by Beach and Kenly, devotes too much space in chapter three to typographic basics that should be covered in a graphic design textbook, but it does offer several pieces of knowledge beyond the basics. A table of common type design mistakes makes for interesting reading, if it is a little on the basic or uninformed side. A section dealing with using type set as a screen tint is useful and not found in many of the works researched for this chapter. Likewise, a section on reverses and overprinting type is helpful, if simplistic in nature.

*Guide to Graphic Print Production* by Johansson, Lundberg, and Ryberg also covers the basics of type usage, but does provide a well-written section on different types of fonts available. It also provides a section on font management utilities available today. While this section is very timely and will likely be out of date before the next edition of the book is published, it does reinforce the need for successful font management in graphic design.

d. Digitizing Data: Color, Scanning, and Photography

This is a fairly broad section on the topic of print production since it covers any way that images are digitally acquired as well as the color adjustments of those images. Every one of the twelve books reviewed has a chapter or two on this topic. Basic topics such as RGB to CMYK conversion and resolution are assumed as a given in any reasonable book on printing methods. Books that go above and beyond on these and other topics are outlined below.
Graphic Design and Production Technology by Greenwald and Luttropp covers this topic in both chapter seven and chapter eight. Much of what is written in these two chapters is far too timely to be of any use; types of computer interfaces, specific types of scanners, and types of storage devices are all out of date at the time of this writing. There are some slightly more timeless topics such as proper scanning resolution, and how halftone screens work. Still, overall this book is based far too much on the technology available at the time it was written to be useful in most applications.

Dan Margulis’ tome on digital color, Professional Photoshop: The Classic Guide to Color Correction is one of the most technical and complete references to using color images in a digital environment. Much of the book quickly becomes too technical for the typical student, but for those wishing to really take control of the color images they use, it is without equal amongst the works reviewed. A student who masters even the simplest methods of color correction outlined in the first few chapters of the book will be able to produce better looking images more often than a student who hasn’t read the book. It covers issues such a L*A*B colorspace in great depth, a topic which is not covered in detail by any of the other books reviewed.

Ann Goodheart’s book, while generally bordering on the simplistic side of things, does a very good job in covering the basics in chapter four. She manages to make several difficult topics seem easy in her coverage of dpi vs. lpi, duotones, and full color separations. Still, it is just the basics here, so anyone wishing to go beyond the most basic details would need to read beyond this book and examine several of the others.

In Designer’s Prepress Companion, a full six chapters are devoted to the topic of image and color use. Chapter seven covers the differences between spot and process colors
thoroughly, including a history of spot color development. Often times, differences between and spot and process color printing are not apparent to design students who seldom are required to create separations for in-class projects. This book does a good job of covering these differences and how they affect the design work. Chapters twelve through fourteen deal with the differences between bitmap and vector graphics and how to properly scan an image. Unlike other resources, they are written in a much more timeless manner and are not out of date even several years after publication. They do get a little technical in their discussion, but not overly so and are useful references on the topics. Chapters seventeen and eighteen cover color, and how to get images to look the way you desire them to. Chapter seventeen begins by reinforcing one of the reasons this thesis was written, “historically, prepress professionals managed color. Today’s computer-driven world requires that designers understand the process of color management if they want to ensure consistent color.” (Berlin et al. 2002, 123) These two chapters provide some basic and intermediate level tips for color conversions and corrections and seem perfect for the level of beginning design students.

If the science of color is of interest, Professional Prepress, Printing, and Publishing by Frank Romano is the book to turn to. It covers color theory, attempting to explain in a more scientific way how color works on a computer. Romano prefaces the chapter with the following statement:

We can often get lost with color because there are so many expert opinions and an equal number of opinionated experts. Each has their own perspectives, each has their own language, each lives in their own favorite “color space,” and each has their own “axe to grind.” To live peacefully with this beast, we must remember only one simple thing: color is just a part of basic human functioning, like breathing. One does not need to know astronomy and cosmology to enjoy looking up at the stars. Remember that same fundamental idea is true of color. A standard language for communication is the key which all color experts must seek, including the artist. (Romano 1999, 259)
Romano’s informative sections on color space, color models, and color correction are timely and comprehensible, if technical. Still, he provides a handy summary-outline at the end of the chapter, a useful reference for any design student who needs to quickly understand some of the more technical jargon associate with color.

Taz Tally’s *Electronic Publishing: Avoiding the Output Blues* simplifies color theory and discusses it in an easy-to-follow manner. He discusses how color is determined by a computer and its monitor and how it works. There’s nothing new here, but it is worth reading because of the way he simplifies very complex processes into a well-written chapter. The end of the chapter provides digital imaging tips which are made to look childish due to the illustrations used and the way he names the “characters” having problems, but once those downfalls are ignored, the tips themselves on using color are quite useful.

Most books on color reproduction are so uninteresting to read that it might be tempting to risk getting bad color on a print job rather than having to read anymore technical jargon about color space models and histograms. Constance Sidles reinforces the need for good color management in her book *Great Production by Design* by using actual life stories to illustrate the point. There is nothing in her chapter eight that isn’t published elsewhere, except the stories which make for some entertaining reading and may have more of an effect on some design students than mathematical formulas about color gamuts do.

**e. Prepress**

Prepress workflows are the heart of any knowledge base for designers regarding getting their works produced. Because prepress is the stage that lies between design and
production, it is perhaps the most likely stage when things can go wrong on a print job. While prepress encompasses many of the topics previously covered like graphics, color, scanning, and fonts, there are specific details that need to be covered in any course on print production.

*The Designer’s Prepress Companion,* by Berlin, Kim, and Talcott, would seem to be the perfect book targeted at designers regarding prepress knowledge, and in many ways it is. Much of the book is devoted to the very topic. Chapter nine of the book covers layouts and impositions, and explains how designs are influenced by the imposition process and how designers need to be aware of this process. Included in the chapter are details on bleeds, printer’s spreads, and gutter creep. As the first paragraph of the chapter says, “Once you understand what printers and binders will do to your designs, you will be better equipped to deliver a design that prints without problems.” (Berlin et al, 2002, 47) The authors couldn’t be more right. Chapter nineteen of the book covers proofing, including how to read a proof, and different proofing methods. Chapter twenty-three covers raster image processing and preflighting and does a good job explaining why designers need to be concerned with these topics. There is useful prepress throughout the rest of the book, as the title would imply.

Romano’s *Professional Prepress, Printing, and Publishing* uses chapter two to cover the entire prepress workflow. It provides a good overview with plenty of detailed information. In some ways it is too broad a chapter; it covers simple topics such as file transfer while also tackling more complex topics such as stochastic screening. Still, to get an overview of the process as a whole, it is a good place to start.

*The Pocket Guide to Digital Prepress,* also by Frank Romano, has perhaps a better breakdown of the prepress topics into individual chapters. Chapter two covers “Preparation
Process Elements” and is about traditional prepress services and how they worked, such as using film and mechanicals. Chapter four covers “Digital Prepress Evolution” and is concerned with the last ten years or so of digital prepress equipment. Chapter nine is titled “Advanced Digital Prepress Technology” and goes into great depth on topics such as screening, dot gain, and trapping. While there is a wealth of information in this book, it does seem to be aimed more at the prepress technician. For designers, the lack of information specifically targeted towards them makes the book less than useful.

Trapping and overprinting inks is occasionally a topic designers need help with. Kayanna Pace’s Designer’s Guide to Print Production does a good job of simplifying this and other processes. Chapter four of her book is titled “Preparing RIP-Ready Files,” a worthy goal for all designers, but like so many others books, this book fails to provide specific information as to where problems occur causing files not to RIP. It becomes too general without really explaining the procedures inherent in prepress.

Constance Sidles’ Great Production by Design is perhaps the easiest and most helpful book on prepress for designers. Her chapter 7, called “Effective Prepress” is full of useful information specifically targeted at designers and presented in a clear, concise manner. Included in the chapter are her “Ten Commandments for Producing Good Prepress” which she lists and then explains what each means. Table 2, on the following page, lists those commandments. This table is just one example of how Sidles often condenses a rather complex list of factors into an easy-to-follow bullet list, a strength of her writing and organizational skills. There are many more examples similar to this table through her book and are all interesting lists.
TABLE 2:
The Ten Commandments for Producing Good Prepress
(Source: Sidles 1998, 89)

<table>
<thead>
<tr>
<th>Commandment</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Make sure your input can be read.</td>
</tr>
<tr>
<td>2.</td>
<td>Create designs that RIP quickly.</td>
</tr>
<tr>
<td>3.</td>
<td>Make sure your color management system is functional.</td>
</tr>
<tr>
<td>4.</td>
<td>Choose the best scanning resolution.</td>
</tr>
<tr>
<td>5.</td>
<td>Follow your printer's standards regarding trapping.</td>
</tr>
<tr>
<td>6.</td>
<td>Allow enough margins for the final trim.</td>
</tr>
<tr>
<td>7.</td>
<td>Take press limitations into account.</td>
</tr>
<tr>
<td>8.</td>
<td>Transport your data files in a useable manner.</td>
</tr>
<tr>
<td>9.</td>
<td>Supply a full-size proof of your job.</td>
</tr>
<tr>
<td>10.</td>
<td>Check everything before you send it.</td>
</tr>
</tbody>
</table>

All of the above are good pointers and are well supported in the text. Lists and tips such as these make for nice checklists for designers.

* A Guide to Graphic Print Production, by Johansson, Ryberg, and Lundberg has a great deal of information regarding prepress. It covers in great detail topics such as using images, output and screening, imposition, and proofing. Overall, the book is an excellent resource on the topic without bringing anything completely new to the topic. It does have one of the better sections on imposition and explaining how that works, although the level of detail it goes into may be beyond the interest of most design students.

* Getting It Printed by Beach and Kenly provides a handy flowchart of a prepress workflow. It is a valid example of such a workflow, although there are so many variations that it is a bit too general. The authors might consider presenting some potential workflow derivations so that the workflow they exhibit isn’t understood to be the one and only prepress workflow. Beyond that, they spend far too much time covering file formats and archaic film processing details, all of which get bogged down in tedium and tend to lose become out of date rather quickly.
f. Offset and Other Printing Methods

Every book on print production has information on printing methods. Even those books specifically targeted towards prepress or design generally still contain a chapter or two on printing. Of the twelve books surveyed, one could gain a wealth of insight into specific printing devices and how they operate. This section will highlight areas of those books which provide unique information to graphic designers regarding the actual printing of their work.

Ann Goodheart’s *Alleviating Prepress Anxiety: How to Manage Your Print Projects for Savings, Schedule, and Quality* focuses not on specific printing devices, but instead on properly writing specifications for a print job. It goes into detail on how quotes can be different if specifications are written incorrectly. As before, the real-life stories add a personal quality to the book and show designers exactly how the price can vary from job to job.

*Professional Prepress, Printing, and Publishing* by Frank Romano provides a good overview of the major printing processes. It covers letterpress, offset lithography, gravure, screen printing, digital printing, and flexography in great detail. As an overview of the different processes, this book is difficult to top. The majority of the discussion is on specifics of the different processes and how the different presses work, and as such is not specific to graphic designers as much as some of the other works referenced.

Understanding what to look for at a press check is something every designer should know, and of all the books considered, the best resource on this topic is Constance Sidles’ *Great Production by Design*. The book tells designers specifically what to look for and how to talk to the press operator or printing company employees dealt with. It is targeted for designers and written in an easy to understand vocabulary.
A good resource for specific information on different printing processes is Johansson, Ryberg, and Lundberg’s *A Guide to Graphic Print Production*. Despite getting into some fairly technical information regarding the operating of different types of printing presses, the clarity of the illustrations detailing the operations makes this book a useful reference. The information regarding dot gain and press checks is useful to all designers. The book goes into great detail on other printing methods besides offset lithography, providing a good overview on gravure, flexography, screen printing, and digital printing.

One of the strengths of *Getting It Printed* by Beach and Kenly is its focus on educating designers regarding press defects. Many of the other books give little information regarding common defects such as hickies, ghosting, slurring, scumming, and setoff. *Getting It Printed* describes these defects and more in clear and concise ways.

g. Paper and Ink

Ways to use and take advantage of differences in paper and ink are often overlooked in design books. Most books describe different ink systems and some of the basic differences between printing on coated or uncoated paper stocks. One of the important details that can be emphasized in a section on paper and ink is the way that specialized paper or custom ink mixes can create unique looking design jobs. Both paper and ink should not be afterthought in the design process, but something that is considered from the beginning, planning stages of the job. As Constance Sidles says about choosing paper, “selecting the right paper is more complex than spending a lot or a little money. Instead of automatically choosing the highest quality, or even the highest quality you can afford, you should figure out the most appropriate paper for your needs.” (Sidles 1998, 62) Most of the books surveyed for this
thesis did not cover paper and ink in great detail, if at all. Those books that did cover the
topic are summarized below.

Sidles’ book, *Great Production by Design*, clarifies different types of paper and their
typical uses. She also provides stories about her personal past experiences using paper and
ink. When discussing ink use, the production value of Sidles’ book actually shows pages
printed using fluorescent inks and spot varnishes, rather than simply discussing them as many
of the books do. Sidles claims that the designer “should have enough working knowledge to
plan designs that maximize the capabilities of the ink and minimize the limitations.” (Sidles
1998, 76) To that end, she does an effective job of describing many of those limitations and
capabilities.

Johansson, Lundberg, and Ryberg do not go into great detail regarding ink in their
Highlights of their book include a section on paper classifications and a section on how to
choose a paper. As they say, “when choosing a paper there are many criteria to evaluate: the
feel of the printed product, its intended life span and price, readability vs. image quality, the
printing method and off press processes you intend to use, how the product will be
distributed, the environmental impact, and the requirements of the printing house. All these
aspects affect the choice of paper in their own way.” (Johansson, Lundberg, and Ryberg
2003, 207) They go on to explain in how these criteria are important in the paper selection
process.

While Kayanna Pace doesn’t get into the topic of paper in her *Designer’s Guide to
Print Production*, she does spend some time discussing inks, including some details that are
not common to other books on the topic. As she says, “because ink is the substance that
makes the copy visible on the substrate, graphic designers need to know more about than just its color.” (Pace 2002, 33) She describes ink properties such as colorant, vehicle, body, and tack in a clear manner, and emphasizes why it is important for designers to understand these properties.

Ann Goodheart’s book, *Alleviating Prepress Anxiety* includes a three-page running table detailing common paper finishes and what the features and challenges are for each of these common finishes. She also deals with paper basis weights, often a source of confusion for graphic designers.

*Getting It Printed* by Beach and Kenly also includes a multi-page table covering paper grades, sizes, common names, features, surfaces, thicknesses, and uses, amongst others. In the ink section, they describe many of the distinctive ink and finish treatments available such as varnish, metallic inks, and aqueous coatings. Without showing examples of the inks or paper stocks, it is difficult to envision what they will actually look and feel like. It is perhaps beyond the scope of a book of this nature to actually present the paper surfaces and ink differences, but without those examples, the book suffers in usefulness.

**h. Finishing and Binding**

Being generally the last step in the production process puts finishing and bindery processes far away from the design stage for a print job. Because of the many steps in between, it is often as an afterthought that finishing and binding methods are included in books on print production. That said, the importance of designing with the finishing and binding method in mind is certainly one that cannot be emphasize enough.
Beach and Kenly cover most aspects of the finishing and binding process in *Getting It Printed*. This section, perhaps more than any other chapter in their book, covers the topic thoroughly. The diagrams used to illustrate such processes as die cutting and scoring make the processes easy to understand. Likewise, their diagrams on folding and signatures help to simplify those processes. They cover different binding styles such as case binding, coil binding, and saddle stitching thoroughly. In addition, they provide a thirteen-point checklist for quality control in finishing and binding. Included on this list are such things as trims with ninety degree corners square with copy, binding that withstands reasonable pull testing, and more. Essentially, they provide a list of things to look at on the finished printed piece to determine if the finishing and binding stages were adequately performed. This is one resource that is not available in most of the other books reviewed. One other section in *Getting It Printed* that is somewhat unique to that resource is a section on final counts. It explains what to do if the print job is delivered with shortages, and how many extras or shortages to expect on a typical print job.

Johansson, Lundberg, and Ryberg refer to the finishing and binding stages as off press processing. They say, “off press processing is the term for all of the finishing treatments applied to printed sheets as they come off the press.” (Johansson, Lundberg, and Ryberg 2003, 238) Their book includes intuitive diagrams and clearly written descriptors on all the major finishing and binding processes: cutting, folding, scoring, binding, punching, laminating, foil stamping, and die cutting. While their terminology is a little different than most printing books in the United States use, the illustrations more than make up for any confusion this might lead to.
Constance Sidles’ *Great Production By Design* has a good deal of useful information on finishing and binding processes. One section of her book that is not seen in many other resources is a section on postal regulations and mailing your designs. In addition, she provides nine production tips for what she calls selective binding. What she calls selective binding is really what is generally called variable data printing, and as such fits more appropriately in another section of the book. Her folding examples are not simple line drawing that most books show, but instead full-color photographs of paper folded in a variety of formats. More importantly, she presents five questions for designers to ask themselves to help in determining which folding style best works for their job. These questions provide a helpful checklist to get the designer thinking about different folding methods. Finally, Sidles covers the issue of the environment when considering how to package finished designs.

As mentioned at the beginning of this section, it is important to consider whether any of the books review can serve as a comprehensive textbook on the subject of print production. Many of the strengths and weaknesses each book were pointed out above as they were considered relative to the eight topics listed. In the pilot-course on print production, both Beach and Kenly’s *Getting It Printing* and Johansson, Lundberg, and Ryberg’s *A Guide to Graphic Print Production* served as classroom textbooks. Other books, such as Greenwald and Luttropp’s *Graphic Design and Production Technology* and Tally’s *Electronic Publishing: Avoiding the Output Blues* include resources for educators such as chapter-ending discussion questions or short assignments for students. However, the level of simplicity, methods of organization, and the dated nature of the information present make these books less than useful as a comprehensive text on the subject. Johansson, Lundberg,
and Ryberg’s book is perhaps the best of the bunch, and presents the material in a clear and well-written manner. It has several shortcomings, among them being some confusion in terminology due to its European origins, as well as a radically different level of organization, that, while being neither difficult nor incorrect, does make it difficult to use as a textbook, causing the students to continuously need to jump from chapter to chapter throughout the book. Still, of what is published today, it is perhaps the best resource available to educators for a class on print production. None of the books can be considered the perfect textbook on the subject at this time.
CHAPTER 3

METHODOLOGY

The hypothesis of this thesis states that print-production techniques for graphic designers can be taught effectively through the use of a combination of lectures, exams, and hands-on, print-production experiences. The methodology for this thesis uses two surveys, a case study including an interview, and a review of a pilot-course in print production.

Two surveys were conducted to determine which topics relating to print production are presently being covered in depth for design students and where common problems occur in the printing process. The first survey was given to graphic design students at the completion of a pilot-course on printing and production methods. Students were asked to identify which topics in the course they felt were most important to them. Additionally, the survey asked students to rate the effectiveness of teaching and evaluation methods used during the course. The second survey was sent to printing industry professionals who work with customer files. This survey asked recipients to identify areas in which common problems occur in the jobs submitted to them by their clients.

A third part of this thesis includes an interview with J.R. Campbell, Associate Professor of Textiles and Clothing at Iowa State University. This interview is featured in a case study that looks at how a different department teaches similar topics. It will look at some ways in which that department addresses the need for their undergraduate students to be able to produce the designs they create. In many ways this is analogous to graphic designers and printing; a textile and clothing designer creates a design for a garment on a computer screen using a variety of sophisticated software, but that on-screen design must then be mass-produced in an entirely different setting using a wide variety of equipment.
This process requires a similar amount of successful communication in order for the design to be produced according to the designer’s desires.

The fourth aspect of this study looks at results from a student project in printing methods conducted in the spring of 2004 during a pilot-course at Iowa State University on printing and production methods.

The findings of the two surveys, case study interview, and the results of the student project in the pilot-course will be examined to determine if any patterns emerge as to what areas of graphic design education for print and production methods need additional emphasis. If there are no patterns, it may indicate that students are being educated adequately, or it may simply imply that problems occur in every situation and more print-production education in general is needed. Based on the findings, recommendations will be made for a graphic design curriculum on the subject of print-production methods.
CHAPTER 4

STUDENT SURVEY ON PRINT-PRODUCTION EDUCATION

During spring semester 2004, 54 students were enrolled in a class at Iowa State University entitled ART GR 372: Graphic Design Materials and Processes. From the 2003-2005 course catalog, the class is described as follows: “Lecture about the processes and materials involved in graphic design arts reproduction. Course covers pre-press, paper selection and specification, ink systems, type systems and fonts, output technology, printing presses and bindery operations.” (Iowa State University 2003, 145) At the end of the semester long course, students were given the option of completing a survey asking them which areas of the content and which teaching methods they found to be most important to them and most effective in informing them of the topics. The results of this survey are analyzed in this chapter. The survey itself is included at the end of this report in Appendix I.

Part 1

Since all participants in this survey were members of one particular class, the only demographic information requested was whether they were male or female. This survey had 51 participants, of which 18 were male and 33 were female.

Part 2

The second part of the survey was designed as a post-course response to determine which broad categories of topics covered in the course were most important to the students. This was intended to help determine how much time should be devoted to individual topics in future courses. The course content was divided into eight topics, listed as: (a) planning
jobs, dealing with printers, and specifying jobs; (b) setting up documents, using fonts, graphics formats; (c) photography, scanning, and color; (d) paper; (e) prepress; (f) offset printing; (g) specialty and digital printing; and (h) finishing and binding methods. Each of these topics were covered in the course, some more in depth than others. Students were asked to rate them on a scale of one to five as shown: (1) not very important; (2) somewhat important; (3) uncertain; (4) important; or (5) very important. This part of the survey was intended to determine how students felt in regard to the topics listed, not whether they thought the topics had been taught effectively in the course. This was made clear to all participants at the time the survey was conducted.

**Data Gathered from Student Survey Part 2**

From the 51 participants for each topic surveyed in part two, responses were tabulated to gauge which topics students found to be most important to them. The results are shown in Figure 2, on the following page.
Responses for the survey topics were all very high, indicating that students considered all of the topics to be important or extremely important. This is hardly surprising, however, as the survey was taken at the end of a semester long course covering all of the above topics in depth. From the responses, however, it is clear that several of the topics rated higher than the others in terms of what topics the students felt were important to them as graphic designers. The two highest rated topics were (b) setting up documents, using fonts,
graphics formats, and (c) photography, scanning, and color. While this may initially be surprising considering how much is discussed every day about digital printing and its role in the future, those are the two main topics that designers need to be most aware of in today’s streamlined digital printing workflow. It is the setting up of files properly and color management that are now definitely in the hands’ of the designers, something a dedicated professional would have been responsible for in the past.

Part 3

The third part of the survey asked the participants to rate several assignments they had completed during the duration of the course. Those assignments are included in Appendix IV. In brief, Short Project 1 required the students to set up files including graphics and type for printing in two spot colors. The files were not actually printed on a press, but were treated as though they were a real job submitted to a printer and required students to include proofs, written specifications, and all relevant electronic files. The files were then preflighted to determine whether they were ready for the printing process or whether significant time would need to be spent by the printing company to prepare the files for printing. In Short Project 2, students were given a list of criteria for a hypothetical design job, such as an invite to a company’s holiday party. Based on budget, client expectations, and printing method preferred, each student needed to propose a paper choice for those criteria. The third classroom assignment included in the survey was for the Studio Collaborative Project which was an assignment completed in conjunction with the students’ studio course that semester. In the project, they were required to design a postcard to a particular size and with particular color requirements. These postcards were then printed on an offset press.
Students were evaluated based on how well the files were prepared for the printing process. Any problems with the files resulted in additional time at the prepress stage, which was indicated on each student’s evaluation form.

Part three of this survey then asked each participant to evaluate the three projects’ effectiveness “as far their usefulness, especially taking into account their real-world applications.” They were asked to rate them on the following scale: (1) for NOT effective at all; (2) for somewhat effective; (3) for uncertain; (4) for effective; (5) for VERY effective. Results for this survey question are shown in Figure 3 below, where (a) is Short Project 1, (b) is Short Project 2, and (C) is the Studio Collaborative Project.

FIGURE 3: Student Survey Results, Part 3

<table>
<thead>
<tr>
<th>Topic</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic (a) Short Project 1</td>
<td>4.18</td>
</tr>
<tr>
<td>Topic (b) Short Project 2</td>
<td>3.20</td>
</tr>
<tr>
<td>Topic (c) Studio Collaborative Project</td>
<td>4.25</td>
</tr>
</tbody>
</table>
Overwhelmingly, Short Project 2 was rated as a far less effective assignment than the other two projects which were rated very similarly. This may, in some regards, be related to the fact that paper, as a topic, rated as a lesser important topic in part two of the survey. It may also be due to the nature of the assignment itself, which was not tested. In any case, Short Project 2 was considered to be a much less effective assignment.

When considering recommendations based on this study, it will become important to look at these results and the way each of the three projects were written to determine how future projects might be described and written up before being assigned to the students.

Part 4

The fourth portion of the student survey asked participants to comment on the effectiveness of the various teaching and evaluation methods used during the duration of the course. They were asked to rate four general methods used: (a) lectures and classroom discussions; (b) guest speakers and guest presenters; (c) class projects and exercises; (d) quizzes and exams. (1) for NOT effective at all, (2) for SOMEWHAT effective, (3) for UNCERTAIN, (4) for EFFECTIVE, and (5) for VERY effective. In explaining the survey question, participants were asked to consider the methods in general and not specifically relating to who was giving the lecture, for instance, or how easy or difficult the quizzes were. Results from this question are shown in Figure 4 on the following page.
Perhaps unsurprisingly, quizzes and exams rated the least effective teaching and evaluation method used during the course. Guest speakers and presenters were the second least effective method, which is interesting in several ways. During the course, eight different guest speakers came to the class to speak on a variety of topics. All of the speakers were professionals in the field of design or printing and were invited to speak on a topic of their particular expertise while that topic was being lectured on. Some speakers were well prepared to speak long and eloquently about the topic, while others mainly used the time to promote their particular company to a class of prospective future clients. It is possibly based on those few guest speakers who spent the hour discussing the relative merits of their
company that caused guest speakers in general to be rated as less effective than other methods. Since the question on the survey did not break down into individual speakers, it is impossible to determine if that is the case. Because of the difficulties in planning guest speakers' actual content with them due to time constraints, having professionals come as guest speakers seems to be a sort of hit or miss proposition. All the speakers were happy to come without fee on their own time, so in that regard any instructor or course planner would be thankful. But without actually being able to review beforehand the content of the speakers' discussions, it is impossible to know, unless they appear year after year, whether they will be able to deliver an effective presentation. Presumably, as a course such as this develops over the years, certain speakers could tailor their presentations for a particular topic of the course with the instructor's insistence and those that simply use the time to promote their own companies could be left off the speaking list the following year.

The survey results show lectures and classroom discussions to be rated as the third most effective teaching and evaluation method. Since the course was primarily a lecture course, there were a lot of lectures. As the course is presently designed, there wouldn't be any content without the lectures so it is of little surprise that they rate at the level listed as "effective," but not extremely effective.

The highest rated method in the survey was that of class project and exercises, including those projects included in part three of this survey. These projects all demanded a more hands-on approach in which the students were actually evaluated based on their doing, not merely listening or watching. This result is exactly in line with the premise of this thesis, that there are better ways to teach printing and production methods to graphic designers other than lectures and exams.
Part 5

Part five of the survey asked participants if they had any suggestions to improve the course. This was an optional section of the survey, and many students left it blank. In total, there were seventeen suggestions given for the course (some suggestions were duplicates, others were disregarded for being personal comments about the instructor) which are listed below and commented upon where appropriate. Since all surveys were submitted anonymously, it is impossible to attribute comments to their author, but all are from members of the class. The comments are divided into sections related to the topic they discuss.

Comments relating to the in-class teaching methods

These comments all directly address the way the instructor presents materials during lectures and demonstrations in class.

“More demos”

“Less info from the book – more real life situations and notes”

“More multimedia. Animations of how machines and processes work. I like to visualize the process. It helps me remember”

“I would have liked more hands-on during class. If we could all work from the same file (on the server or something) and go step-by-step together on our laptops to get the file ready to print.”

These are all good points. The fact that in recent years most, if not all students bring laptops to class make the idea of working through files together possible without being in a computer lab environment. Multimedia in the form of videos showing particular production machines in action could be an effective visual aid where field trips and other demonstrations
are impossible. More demos and more real-life situations are fairly vague, and would depend greatly on whom the instructor of the course is as to whether they could share such knowledge. Demonstrations (it is assumed here the respondent meant file demonstrations) are already included and it depends on the structure of the course how many will fit into a given semester.

Comments relating to the topic of file set-up and graphic formats

Several students made additional comments about setting up files and graphics. Because this topic was the highest rated topic in part two of this survey, these suggestions are especially relevant.

“More emphasis on file maintenance and set-up”

“I still feel we didn’t get enough background on how to save files correctly, what formats to use, etc.”

“More examples such as getting files, converting images properly, and resolution issues. May be boring to go step-by-step through these but it would be helpful to know the procedure”

These topics were all addressed in the course, but it is clear that some students feel that they need more information and class time on these topics. It may be helpful to add more assignments or projects that address these topics.
Comments relating to guest speakers

Because guest speakers scored relatively low in part four of the survey is could be helpful to have additional feedback as to why participants felt these speakers weren’t as effective as they could have been. Here are a few comments:

“Try to get the guest speakers say less about themselves and their company history and more about what they do and how it applies to us.”

“Have a post office person come teach about regulations”

“Guest speakers overlapped somewhat – prep them on what the class has already learned.”

Most of these comments were addressed and are due to lack of planning between the instructor and the guest speaker, primarily due to lack of acquaintance between the two and lack of time and communication for actual content planning. The idea of having a post office employee come and discuss postal regulations is interesting as that is a topic that was not covered in the pilot-course.

Comments relating to class projects

The final grouping of comments from the student survey relate to the projects and exercises done in class. Since this was the highest rated teaching and evaluation method as shown in part four of the survey, they are certainly relevant to the discussion.

“Postcard project [Studio Collaborative Project] was good, but having it tied in to 371 [the studio component class] was problematic. Was hard to get it done on time.”

“Make the project better – you basically gave us a step-by-step – not all that hard”
“Anything hands on helped me a lot. The assignments really helped put what we learned into a “physical” form. More field trips and assignments. The quizzes didn’t challenge me.”

“The exercises were the most helpful in this class”

“Have them make a postcard, but maybe not tied in with a random project…cause I don’t know what to do with 50 odd postcards – maybe have it be like a portfolio piece or contact or business card.”

From the comments, and results from part four of the survey, it would seem that the projects were useful to the course, but could have been more in quantity and perhaps more challenging or more directed towards student needs. One of the plans for this study is to determine those needs and propose additional or revised projects for future courses.
CHAPTER 5

PROFESSIONAL SURVEY ON PRINTING PROBLEMS

The second of the two surveys used in this study was sent to forty printers around the Midwest in the summer of 2004. Of these surveys sent out, eighteen were returned and their results are included in this study. This survey was intended to get some feedback from printing industry professionals as to the common problems and errors found in design jobs submitted to their companies. The survey specifically asked prepress operators how often certain errors were made. The survey did not distinguish between jobs submitted to these printers by people with formal design education and those without such education. The hope was to get an idea where common problems occur in the printing process in order to propose changes to a class on print production based on the analysis of these surveys.

Part 1

The first part of the survey was background demographic information. Two questions were asked in this part, the first being how many years the respondent had worked in the graphic arts industry and the second asking what type of printing their company specializes in. The options for response in the second question were offset printing of four or more colors, offset printing of less than four colors, one- or two-color printing, short run one-color and black-and-white printing (quick printers), digital printing, or large-format printing. Respondents were asked to check all answers that applied to the work their printing company did.
From the first question, the average survey respondent has worked in the graphic arts industry 18.65 years for a combined 297 years of industry experience. These professionals work at companies that specialize in the types of printing shown in Table 3.

TABLE 3: Printing Company Demographics

<table>
<thead>
<tr>
<th>Type of Printing</th>
<th># of companies specializing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offset printing of four or more colors</td>
<td>13</td>
</tr>
<tr>
<td>Offset printing of less than four colors</td>
<td>12</td>
</tr>
<tr>
<td>1- or 2-color printing</td>
<td>13</td>
</tr>
<tr>
<td>Short run 1-color or black-and-white printing</td>
<td>11</td>
</tr>
<tr>
<td>Digital printing</td>
<td>8</td>
</tr>
<tr>
<td>Large-format printing</td>
<td>6</td>
</tr>
</tbody>
</table>

Most of the respondents work at companies that specialize in the traditional offset printing technologies. Some work at companies that have expanded into the newer printing technologies of digital printing and large-format printing, although those number less than half the respondents. The combined work experience and variety of printing specializations should provide a wide spectrum of results for the remainder of the survey.

Part 2

Part two of the professional survey asked respondents how often a particular problem occurs in jobs they work with at their companies. Thirteen common problems were selected, all of which related directly to the topics from the second part of the student survey. The results of the survey are shown in Figure 5, on the following page.
FIGURE 5:
Professional Survey Results, Part 2

<table>
<thead>
<tr>
<th>Problem</th>
<th>Description</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem (a)</td>
<td>Job doesn't match specifications or estimate resulting in additional cost</td>
<td>3.22</td>
</tr>
<tr>
<td>Problem (b)</td>
<td>Job created using incorrect file formats</td>
<td>3.44</td>
</tr>
<tr>
<td>Problem (c)</td>
<td>Client's application is not supported</td>
<td>2.88</td>
</tr>
<tr>
<td>Problem (d)</td>
<td>Job is missing elements</td>
<td>3.72</td>
</tr>
<tr>
<td>Problem (e)</td>
<td>Improper resolution for images</td>
<td>3.39</td>
</tr>
<tr>
<td>Problem (f)</td>
<td>File is too complex to process</td>
<td>2.50</td>
</tr>
<tr>
<td>Problem (g)</td>
<td>Job is set up incorrectly for size, bleeds, and/or fold considerations.</td>
<td>3.33</td>
</tr>
<tr>
<td>Problem (h)</td>
<td>Job is set up in an improper color space</td>
<td>3.71</td>
</tr>
<tr>
<td>Problem (i)</td>
<td>Color issues relating to poor color management, lack of understanding of dot gain and other color reproduction problems</td>
<td>3.00</td>
</tr>
<tr>
<td>Problem (j)</td>
<td>The customer uses the proofing stage for correction of typos and other errors that should have been addressed before submitting the job</td>
<td>3.56</td>
</tr>
<tr>
<td>Problem (k)</td>
<td>The customer doesn't understand limitations and the effect of different paper finishes and colors on the final printed piece</td>
<td>3.33</td>
</tr>
<tr>
<td>Problem (l)</td>
<td>The customer fails to understand the limitations of the process relating to the output device</td>
<td>3.56</td>
</tr>
<tr>
<td>Problem (m)</td>
<td>Client's design does not meet postal regulations</td>
<td>3.13</td>
</tr>
</tbody>
</table>

The average response in the above table indicates the average value between one and four that the survey respondents indicated. A value of one indicates that the problem never occurs.
A response of two indicates that the problem occurs rarely. A response of three indicates that the problem occurs sometimes, and response of four indicates the problem occurs often.

Below, the thirteen problems are identified and briefly described.

Problem (a) - *Job doesn’t match specifications or estimate resulting in additional cost.*

Often when a designer begins the process of planning a job, they contact a printer and communicate with the printer what they intend the outcome of their printed piece to look like. They may even get an estimate and proceed with designing the job at this point. Often things will change with the layout of the piece during the design process. If these changes alter the physical form of the printed piece, the files submitted to the printer will not match what the printer estimated. Someone will need to make the changes to the files to match the estimate, or, the price will need to change to reflect the new design. In either scenario, the price will be different than what the designer (and their client) expected. If significant work needs to be done to alter the design, deadlines may need to be pushed back as well.

Problem (b) - *Job created using incorrect file formats (e.g., JPEG vs. TIFF).*

With all the different software applications on the market today, there are countless types of digital file formats that can be used. Some work well for the printing process, others work less well, while still others will not print at all. In addition, the type of printing being done will help determine the types of files needed. While there may be four or five acceptable file types for any potential scenario, the wrong file formats can take a lot of time to fix.
Problem (c) - *Client’s application is not supported* (e.g., *MS Publisher, Word, CorelDraw*).

Software used for both design and printing is constantly changing, so what was impossible to use a year ago may be acceptable to use now. Additionally, some printers will take any file and try and make it work, while other printers are more particular about the file formats they accept. It used to be impossible to use a word processing program, for example, and create color separations from that program. Digital color printing has made this less important, and improved prepress software has made offset printing from word processor files possible. So this problem is one that is constantly changing and it often dependent upon who the printer is and what they will accept. Still, it is an important consideration and one that may still be relevant to graphic designers who are unlikely to use, say, a word processor, but are still often found guilty of using the wrong tool for a particular job.

Problem (d) - *Job is missing elements* (e.g., *fonts, graphics, etc*).

This was once perhaps the most prevalent problem with jobs submitted to printers. Recent upgrades to design software programs which allow the user to “package” their files have helped by automatically creating a single folder for all of the files needed for a particular job. As with anything automated, this is not foolproof and can still be a constant headache for prepress operators. The result of missing elements is a burden for the printing company, who will have wasted time working on a particular job only to have to stop and wait to contact the designer to get the missing elements. Sometimes this can take days, if, for example, the designer submitted a job just prior to leaving on vacation. The resulting change of schedule is likely to be a problem for both the printer and the client.
Problem (e) - *Improper resolution for images.*

Providing bitmap images of adequate resolution for the printing process being used on a particular job is an essential requirement to get images to appear as desired in print. It is generally not a difficult concept to instill in designers, but problems occur all too often.

Problem (f) - *File is too complex to process (e.g., Illustrator files won’t RIP).*

Design software is updated often, sometimes annually, by the software developers. At a cost of tens to hundreds of thousands of dollars for new imagesetting equipment and due to less frequent imagesetter software updates, printing companies are often incapable of keeping up with the tools in the newest software releases. Occasionally, designers who try to do too much, i.e., use every new tool in the newest software, will create designs that simply will not print. This is often a problem that is dependent upon the technology of a particular printing company, but designers need to be aware of limitations in the printing process. Just because something looks good on their screen or even from their office printer doesn’t mean it will survive the rigors of the printing process with the same quality.

Problem (g) - *Job is set up incorrectly for size, bleeds, and/or fold considerations.*

This is another area where designers often don’t understand the some basic principles of the printing process. Imposition standards such as reader’s vs. printer’s spreads, and how a printed piece will be finished such as the folding, final trim, and binding method are often complicated procedures that are done in mass quantity. A designer usually needs to make one or two proofs that are assembled by hand. When they are produced at speeds of
thousands per hour things may come out differently. Designers need to be educated in how
these procedures work and how they affect their designs.

Problem (h) - *Job is set up in an improper color space (e.g., RGB vs. CMYK, does not separate properly for multicolor work, multiple Pantone color names, etc.).*

Color space and separations are less of an issue today because of the improved quality, speed, and cost of digital printing, which often doesn’t require a particular color space or separations. Even so, based on part one of this survey, offset printing is still very prevalent and the designer needs to understand the printing process and how separations work. Because film and paste-ups are basically a thing of the past, it is essential that designers of today have some education into how the printing process works with color separations as they don’t have the hands-on experience of designers of the past with individual layers of color.

Problem (i) - *Color issues relating to poor color management, lack of understanding of dot gain and other color reproduction problems (e.g., improper ICC profiles).*

If the onslaught of digital printing has made color space less of an issue for designers to deal with, it has had exactly the opposite effect on color management. In the past it was common for a designer to submit an image to a printer and they would convert and color correct the image to the proper color space and color management settings for their particular printing press. Today, designers are often responsible for providing print-ready designs that are ready to print when they reach the printer and require minimal amounts of image
adjustment. It is crucial for designers to understand the relationship between scanner, monitor, and printer and to be able to control their color to provide optimal results.

Problem (j) - The customer uses the proofing stage for correction of typos and other errors that should have been addressed before submitting the job.

Often this is more a fault of an editor or editorial team than the designer, but designers and everyone involved in the creation process need to be aware that every change or alteration made once a job is submitted to a printing company will result in additional charges and increase the time required to print the job. Even if the change is made by an editor, the designer may still be responsible for meeting a particular deadline.

Problem (k) - The customer doesn’t understand limitations and the effect of different paper finishes and colors on the final printed piece (e.g., color shift, ink absorption).

This is a topic that is often difficult to teach in today’s classroom setting where many of the projects produced are done so using laser or ink jet technologies. These printers are affected differently by changes in paper stock than are offset printing presses. In addition, the profusion of digital printing technologies and large-format printing has, in recent years, added new variables to the paper mix and forced many experienced designers to relearn how paper, ink, and toner interact with each other.
Problem (l) - *The customer fails to understand the limitations of the process relating to the press or output device.*

This is an enormous topic. There are so many different types of printing devices and printing processes that no class or learning institute could possibly instill the knowledge of how every printing device works. Even so, it is still important that students are made aware of inherent differences with different printers and are taught how to compensate or take advantage of those differences.

Problem (m) - *Client’s design does not meet postal regulations.*

This is a topic that is often an afterthought to designers. It’s not an enormous topic to cover – a single day workshop covering rules and regulations would give designers an opportunity to gain a basic level of understanding. Because postal regulations change often, designers need to have a basic understanding and be able to find new rules and regulations as they need them. A designer who doesn’t understand these regulations can conceivably cost their client thousands of dollars in postage for a minor error at the time the design is planned.

One of the reasons this professional survey was conducted was to find which problems with client’s files employees at printing companies considered to be the most frequent. This, when combined with the results from the student survey would hopefully identify areas in which a course on printing and production methods for graphic designers could be expanded upon or enhanced. From the results of the professional survey, respondents have identified missing elements and files as the most common problem. This is also one of the easiest to fix and least damaging to the final outcome of the printed piece. The
major outcome of this problem is lost time, but results are seldom poor because of missing elements. Another common problem is files received which are not in the proper color space or do not separate properly. This is a more serious problem and directly reflects the student response where they rated both files, including graphics files, and the use of color as topics they found to be extremely important to them. The third and fourth most commonly identified problems had the same number of responses. Customers using the proofing stage for initial proofreading or editing was identified as a common occurrence. However, as has previously been mentioned, this is often more of an editorial mistake than a design mistake. The other major problem identified is when designers don’t understand the limitations or qualities of a particular press or output device. This can be a major reason for poor quality in final printed pieces, as well as an area where designers have the opportunity to take advantage of the particular qualities of a certain printing device to optimize quality and price.

**Part 3**

Part three of the professional survey asked respondents to “briefly describe the steps (if any) they had taken to educate their clients in order to reduce problems such as those listed in part two of the survey.” This was an optional section, and again, responses were anonymous and as such cannot be attributed to any one person. Printing companies often need to educate their clients and do so in a variety of ways. While it can be expensive to take the time to offer training or to produce training materials, it can often pay off in the long run with a more educated client base. The goal of this question on the survey was to get a broad understanding of what steps these companies are taking with their clients, and from these
responses determine if any of these steps might be integrated into a classroom situation. A summary of the comments follows.

Many of those who responded said their company offers seminars or classes. As one respondent said, “we have held seminars on color management compatibilities, but interest does not seem to be there in a large amount.” Others mentioned they offered one-on-one training sessions or meetings with customers to cover specific problems they might be having.

Several other companies produced printed materials or web sites with instructions and tips on them. These could be guidebooks covering a range of materials or documents specific to one area of that company’s products.

Finally, several respondents mentioned leaving it up to the customer service representatives to inform clients of the problems with their files. Sometimes they would ask for new files, other times the prepress department would fix the files, depending on the situation. As one respondent mentioned, “our sales staff and prepress personnel educate our clients. But as our client base increases, the problems for the most part continue.” Another respondent echoed these sentiments, “too many new clients to keep educated. Massive turnover of clients.” As to having the prepress operators fix the problems, one respondent said, “depending on the severity of the problem, we normally fix it and make the customer aware of the issue. Most customers want us to fix the file to save time and effort on their part.” What should be made clear is that any time a prepress operator fixes any problems, they are spending their time which is generally billed to the client. By providing print-ready designs, designers will save time, money, and likely headaches in the production process. Education of clients might be a nice gesture and one that in the long run can save a printing
company time, but it can also be a double-edged sword. Time spent educating clients and in training sessions is time that could otherwise be spent on production jobs with billable hours. A busy company may simply not have the time to spend training customers, even though they know that doing so might help them down the line.
CHAPTER 6
A CASE STUDY IN TEXTILE DESIGN EDUCATION

One field that has many parallels to the production processes graphic designers go through is textile design. Historically, textile designs were produced through dyeing processes or through screen and stencil printing processes. These printing techniques were largely hand-done and prepared by professionals who were responsible for one specific area of the workflow. Today, with changing technologies, the textile designer is increasingly responsible for creating print-ready designs for digital printing techniques on textiles and fabrics. Just like graphic design has evolved through the ages with changes in technology, so has the textile design industry – “prints have been used in fabrics for thousands of years and were handcrafted. As the industry evolved and technology improved, so did the printing methods.” (Colussy and Greenberg 2005, 175)

Not unlike graphic design, new advances in digital printing processes for textile designers have lead to the potential of a more efficient workflow. Bypassing steps such as those involving plate makers, stencil makers, and other production artists, textile designers are able to take more control of the production process. Figure 6 shows a typical textile design workflows from the design stage through to product distribution, both in traditional methods and with digital printing methods. As can be seen, the digital workflow bypasses several steps that were necessary in the more traditional processes. This has the advantage of giving more power to the designer; this can become a disadvantage if the designer is not prepared to handle this additional responsibility. It also has the ability to substantially speed up the process from design to print and to allow for new ideas, such as print-on-demand or mass customization to take place.
FIGURE 6:
Traditional vs. Digital Textile Printing Processes
(Source: Colussy and Greenberg 2005, 174)

Traditional print production process for textile design

1. DESIGN
2. CONVERTER
3. REPEAT
4. ENGRAVER
5. PRODUCE PRINT
6. SWATCHING
7. FABRIC SALE
8. PRODUCT MADE
9. DISTRIBUTION
10. CONSUMER

Digital print production process for textile design

1. DESIGN
2. PRODUCE PRINT
3. SWATCHING
4. FABRIC SALE
5. PRODUCT MADE
6. DISTRIBUTION
7. CONSUMER

Compare the above figure to Figure 7 on the following page, which shows two typical workflows for graphic design, one using a more traditional offset printing workflow and the other showing a newer, digital printing workflow. There are variations in any workflow, those presented in the figure are fairly general, common workflows.
Again, several steps in the workflow disappear, giving the potential for a faster turnaround time on printed products. Those missing steps can also result in a lower cost of the final printed product. According to one finding, the cost savings for bypassing plate-making and
makeready stages in print jobs “results in a savings of about 40+% in dollars and 70+% in
time.” (Romano 1996, 296)

In addition to the potential of saving time and money with digital printing processes,
it is also worth considering how a different printing method can have an effect on the design
process as well. Now, by moving textile design onto a computer screen, the designer can
often get a better gauge as to how the finished product will look. “Not only do digital
technologies increase design possibilities, but the equipment itself stimulates creative
thinking.” (Anonymous 2002, 33) Similar to how advances in technology changed the way
graphic designers work, the addition of digital printing to textile design is rapidly changing
the way textile designers practice their craft. Because most textiles are printed using screen
printing or stencil printing techniques, they generally have a limited color palette, using spot
or flat colors rather than a blend of colors generally found in offset printing for graphic
design. “This new fabric printing method uses printing technology that is similar to ink jet
printing on paper and provides virtually limitless color possibilities. Millions of colors can be
printed on a fabric at a time.” (Dalquist 2000, 9) Textiles designers can now manipulate
images on computers, a technique difficult or impossible in years past. Weaver and fabric
dyer Lia Cook uses childhood photographs and recent self-portraits to create images in her
designs. In traditional textile design such images would be limited to flat color, but today
vibrant imagery can be used. “She believes that the distortion of images animate them and
give them a sense of being alive. Technology allows her to experiment so that she can ask
more questions and explore more ways to express herself and her work.” (Anonymous 2002,
34) In this instance, digital technology allows a designer to pursue her concept, a concept that
in the past would have been limited in terms of realization.
When computers became a prevalent tool in graphic design, many people worried that the industry would become overwhelmed with amateurs, the phenomenon of “anyone with the software can be a designer.” As time has shown, this has not been the case. The computer became a handy tool that changed the industry, but did not destroy it. Many of the same hands-on skills and design fundamentals taught in the years before computers were used in design are still being taught and are still important to becoming a competent designer. The same is true in textile design. Digital printing may well change the industry, but formative skills are still necessary for survival, or least, competence. “The ink jet printer is the new kid on the block, the one getting the most attention; and although it will change the way many artists and designers work, it will not undermine the authority of the brush, the needle, the shuttle, or the dyepot.” (Pollen 2000, 13) In fact, some would argue that the advances in technology would put additional responsibility in the hands of the designer. As shown in Figures 6 and 7, when steps are removed from the design-to-production process, much of the added responsibilities fall to the designer. “The manual skill involved in inkjet printing is minimal, but there will be a greater need for more designs and more designers. The people we will need are people with heads, not hands, who will create the artwork we need.” (Watkins 1999, xxi)

As with graphic design, the role of the educator in the textile design process has changed over the years. Instructors in college-level courses have seen the skills necessary for graduating designers change in recent years. In textile design, CAD, or Computer Aided Design skills have become necessary in order for designs to be produced. “The world is fast becoming a digital global marketplace, especially in the apparel/textile industry. Continual technology integration of all aspects of apparel/textile curriculum is a mandatory ongoing
process that is an essential ingredient for future evolving employment opportunities in the marketplace." (Polvinen 1996, 49) As technology changed the way designers worked and the ways in which their works were produced, it became important for the education of future designers to reflect those changes.

In textile design, digital printing techniques are perhaps not as prevalent as they are within the field of graphic design. More traditional dyeing and printing techniques are still the status quo for work that is mass-produced. Meanwhile the design stage may still be more segmented than it is in graphic design. While graphic designers often do all of the set-up work themselves on their own computers for a particular design, textile designers still will often turn to a CAD professional to render their designs into producible realities. This is changing however, and many textile designers are learning the power of digital design and printing, not just in the sense that it might speed production, but in new possibilities it opens to them. As one textile designer says, “digital design and production does change the work. My sources of inspiration, methods of composition and aesthetics remained virtually constant. But, how I manipulated and developed the images; the complexity of the images and the color; the contact with materials; the potential for literalness; and especially, the working environment all did change.” (Brandeis 2004, 46)

In addition to digital devices driving the textile industry, there is another key trend in the industry. As terms like variable data printing pervade the design industry, so too do terms like mass customization flood the textile design industry. “Mass customization is the ability to design and render small or large quantities of fabric or garments that have been individually customized.” (Colussy and Greenberg 2005, 183) Mass customization of textile
and apparel design is the equivalent of print-on-demand in the graphic design world and is a new hot term for designers today.

To reflect changes in the textiles industry, textile education has had to adapt along with the technology in order to keep up with the pace of the changes. To look at how some industry shifts affected education, the department of textiles and clothing at Iowa State University was considered a case study. The author of this study wanted to know what, if any, changes in curriculum were made to reflect the changes in industry in recent years.

Years ago, people who created designs for printing on the surface of textiles were artists with an emphasis on fine arts, or the creation of image on paper. These “paintings” were then shopped and sold to textiles companies who would use engravers and separators (finely skilled tradesmen) to prepare the design for printing on fabric. There was a sense of specialization in which the designer had no role in the production of the printed fabric. “In the past, teaching-wise, it was purely a design, and or art-oriented focus,” says J.R. Campbell, Assistant Professor in Textiles and Clothing at Iowa State University, when speaking of teaching textile design before recent technology changes. He continues on to say

In the past, there were two completely different approaches to the teaching. There were the people who were being taught textile design from an art focus point of view; working on image, working with color, really just conceptualizing the image, and then, there were a few select universities teaching people engraving and production processes. (Campbell, 2004.)

Today, education for textile designers must focus on the production end of the process in addition to the design end. In the industry, designs submitted to be produced are no longer submitted as paintings that go to skilled tradesmen to prepare for printing. Instead, designs submitted for production are expected to be “in repeat and color reduced, and this
gives the designer the advantage of having control over what it looks like closer to the finished product. A lot of people see that as a design advantage, but it does mean that when we are teaching it we’re having to teach a more holistic approach to the whole process. The trend in education in the U.S. has been away from super-specialization towards more holistic approaches in general.” (Campbell 2004)

As academic programs expand to cover more topics out of necessity (such as the incorporation of digital technology in a textile design curriculum,) departments often have to offer less courses in certain areas. In the past there might have been three or four courses in sequence to cover textile design, whereas today there might only be one course offered on the subject. At Iowa State University, there is one course offered on digital textile design, entitled TC 321: Computer Aided Textile and Fashion Design. The syllabus for TC 321 can be found in Appendix III. Similar to a graphic design course teaching printing and production, this course stresses textile design with the idea that the designs created will be mass-produced. Just like in graphic design, however, most of the classroom projects are not carried all the way through to produced, printed fabric. “But,” Campbell says, “when they present their ideas, they have to present them as though they fully understand how they will be produced. I have them present by telling me exactly what kind of fabric they’re going to be printing to, what the product type or category is, how it’s going to be produced (screen printing or whatever)... They have to know how it’s going to be printed.” (Campbell, 2004.) As for teaching about specific processes, the course doesn’t emphasize the fundamental details on different presses, for example, but students are expected to understand different processes, such as “knowing the difference between rotary screen printed and hand screen
printed or an engineered print like you would have on a t-shirt versus a repeating design.” (Campbell 2004)

In graphic design, the chosen output device can have a dramatic effect on the design itself. For example, a designer creating a page to be printed on a digital printer needs to do things differently than if that same page was being printed on an offset press. The same is true in textile design, perhaps even to a greater extent. Designs intended for screen printing must be in spot color and ready to separate for printing. In addition, if they are covering the entire surface of a fabric, they need to be in interlocking repeats, whereas if they are being printed as engineered prints, such as on a t-shirt, the repeat is not important. Textile designs intended for digital printing need to be in process color mode, not set as spot colors, so the separations work differently and the design itself has different possibilities. In designing projects for the TC 321 course at Iowa State University, J.R. Campbell delineates the projects between the approaches to traditional screen printing and digital printing. “I try to get them to work through the hardest processes first, and then understand the differences by releasing them from those barriers as they go farther through the semester.” (Campbell 2004) Those barriers he speaks of are the differences between screen printing, which has many limitations in its spot color only requirements and digital printing, which opens up a new world of possibilities with full color and blending of colors available. Still, “99% of the people out there are still designing for screen printing, so they have to know how to color reduce and they have to know how to create perfect repeats that are graphically exciting with just a few colors.” (Campbell 2004)

Problems also arise with new technologies and how they are incorporated into the design-to-print workflow. Typically in textile design, if a designer wants to create a swatch
test of their design (called a one-off,) the time and cost involved is enormous as separations need to be created and screens need to be made. Today, there is the potential to run a one-off in a matter of minutes at very little cost on an ink-jet printer. Differences in color and quality between an ink-jet proof and the final printed piece could be large enough to cause headaches at the end of the print-run. This issue is common in graphic design as well where designers commonly use ink-jet printers to color calibrate their photos for printing on offset presses. In the textile industry, the difference in printing devices is largely complicated by the dramatic differences in color spaces the difference devices use:

It is no longer enough to be able to print fabric digitally, the industry is requiring color matching and management throughout the complete design workflow, from scanning, to calibrated monitors, spectrophotometers, to the digital printer. Future hardware and software developments for the textile industry may include combinations of spot and process printing systems, and customization of a wider range of ink colors that can be selected depending upon the color space requirements of the design to be printed. (Gordon 2001)

These are major issues that are being addressed more and more with each passing year and as software and hardware is updated. Campbell says “in the next couple of years there may still be companies that are strictly screen printing companies that are using ink-jet printing as their proofing process, but there will be a lot more companies that are using ink-jet printing as their production tool.” (Campbell 2004) Students who are able to meet these new challenges will be better prepared for changing markets and evolving technologies. The difficulty for educators is preparing students for those challenges. “That’s where it becomes difficult in the teaching,” says Campbell, “because trying to differentiate what the real issues are for students is very complex. The truth is, we really need to be able to have three or four
courses in sequence so that they can bring themselves to the level of complexity to recognize the differences that exist.” (Campbell 2004)

The textile design and printing industry closely parallels the graphic design industry in its adoption of digital printing, except that it is roughly ten years behind. In the early 1990s, digital printing became possible for graphic designers, but was initially used rarely due to cost, quality, and speed limitations. Today, digital printing is available for the textile designer, but again, is rarely used due to cost, quality, and speed limitations. This is changing rapidly, however, just like how digital printing quickly evolved in the graphic arts.

In teaching TC 321, Campbell focuses strongly on the conceptual end of design, but with the idea of getting those designs produced in mind. As Campbell states, “we really have to approach it in a holistic way because students in our program are competing with people who have the gamut of skills because they’ve gone to technical schools that teach three or four levels of pattern making and whatever else [is taught.]” (Campbell 2004) The class he teaches is entirely project based, without tests or quizzes. There are four major projects during the course of a semester. The class size is small, limited by the number of computers in the computer lab in which it taught. Demonstrations and lectures are extemporaneous and given when problems arise in class or when deemed necessary. He prefers a classroom where students use each other as a resource.

The projects themselves are structured and based upon the intended production process. Project one is titled “Designing for traditional print methods.” Project two is called “Designing for digital textile printing.” Project three is titled “Designing digital knits and wovens,” while the final project allows the student their choice of production method but which ever method is chosen must be justified in writing by the student. There is a wide
variety of knowledge that must be comprehended by the students across a wide array of printing techniques, and in this case, the instructor has chosen to use a class entirely consisting of hands-on projects to deliver that knowledge. Whether this approach is more or less successful in teaching aspects of printing and production is not within the scope of this study to determine, but it certainly is more in keeping with the other elements of a graphic designer’s education.
CHAPTER 7

RESULTS FROM THE STUDIO COLLABORATIVE PROJECT

In the spring of 2004, the same students in the pilot-course surveyed in chapter four of this study engaged in a project in which they each had a postcard professionally printed. The actual project description for this project is included in Appendix IV of this study. For many of the 54 students, this was their first opportunity to have a design of their own printed on an offset press.

The project did not consider the merits of the design itself, simply the technical qualifications of the files submitted to the printer. In other words, was the design print-ready? Students were graded on how well the files were set up with regards to the printing process outlined to them in the project statement. Each time a problem occurred during the process of printing the files, it was recorded for this study.

Students were given very specific requirements for the project. The front of the postcard was to be printed in CMYK using a four-color offset press. The backs would be printed with two spot colors from a list of color options provided to the students. The size of the postcards was set at 5.5" wide by 4" tall. Bleeds were allowed on all four sides, both front and back. Special post-printing processes such as folding, diecutting, or varnish coats were not available. There was no limitation set on the number of graphics or amount of copy on each postcard, and the software the students used to create the graphics and type was up to them. The only requirements in this regard were that the final postcard must be submitted as a file from a page layout software application.

From these requirements, students submitted their file(s). These files were then analyzed by their instructor and prepared for the printing processes by imposing them in
gangs of eight on a press sheet to be printed. The errors found in the jobs submitted by the 54 students are shown in Table 4.

**TABLE 4:**
Errors in Studio Collaborative Project Files

<table>
<thead>
<tr>
<th>Color and Image Issues</th>
<th>Number of Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitmap images linked in embedded file, not on disk</td>
<td>6</td>
</tr>
<tr>
<td>Wrong image format</td>
<td>6</td>
</tr>
<tr>
<td>Images missing</td>
<td>5</td>
</tr>
<tr>
<td>Multiple spot colors for 2-color side</td>
<td>5</td>
</tr>
<tr>
<td>Images not linked properly in page layout file</td>
<td>4</td>
</tr>
<tr>
<td>Images set up in wrong color space (won't separate)</td>
<td>3</td>
</tr>
<tr>
<td>Spot color set to a process build</td>
<td>3</td>
</tr>
<tr>
<td>Images are too low of resolution</td>
<td>3</td>
</tr>
<tr>
<td>Images are too high of resolution</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Font Issues</th>
<th>Number of Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fonts missing printer file</td>
<td>2</td>
</tr>
<tr>
<td>Fonts used in a linked file not on disk</td>
<td>2</td>
</tr>
<tr>
<td>Conversion problems from Windows to Macintosh</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Miscellaneous Issues</th>
<th>Number of Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bleeds not set up properly</td>
<td>7</td>
</tr>
<tr>
<td>Transparency or other effect provides unpredictable results</td>
<td>6</td>
</tr>
<tr>
<td>Design incompatible with final trim</td>
<td>3</td>
</tr>
</tbody>
</table>

The types of errors recorded in student files in the Studio Collaborative Project correspond closely to the findings of the two surveys. Namely, that file formats and graphic issues are prevalent and a source of common problems. Fonts are also still a problem in all findings. Issues such as bleed and trim problems have been noted previously as well. Finally, color issues such as creating files that separate properly and the management of spot colors are present in several permutations. The issue of color management or use of color profiles for particular output devices was not considered in this project.

It should be noted that this project came towards the end of the semester-long course when students had been subject to lectures and in-class demonstrations covering all of the topics listed. Additionally, previous exercises had exposed students to many of the graphic
format issues that were looked at in this project. There were still recurring problems, however, a possible indication that more emphasis needs to be placed on those areas of problems found in this project. Several examples of postcards created for the Studio Collaborative Project are shown in Figure 8.

**FIGURE 8:**
**Studio Collaborative Project Examples**
*Student designers: Audrey Baye (top), Abby Eisenbacher (below)*

The Studio Collaborative Project was a project that gave students a hands-on experience with offset printing. It did not delve into areas such as digital printing and large format printing, both hot topics of the day. In those instances where students had a particular
color they wanted matched from their screen, for example, they were able to see the
differences between color on a digital proof device and an offset press first hand on the final
printed postcard. When they pushed the boundaries of the final trim or bleed, something that
is never a problem on classroom digital prints, they were able to see how a mass-produced
trim could cause inconsistencies in the final printed pieces.

From the findings of the two surveys and the project analysis, a variety of common
problems and student expectations have been noted. Those findings will be addressed in the
conclusion of this study.
CHAPTER 8
CONCLUSION

In an ideal world, university-level graphic design students would receive an education that includes a diverse training in both design and in getting those designs produced. In this ideal world, a single course during a four-year education in which students are lectured regarding their options in the printing world would not be sufficient. But education is always a compromise of sorts, a challenge to determine which aspects of a particular field are most vital in order for that program’s graduates to be successful beyond their schooling. In the ideal world, design students would be trained as competent designers and have access to the many different printing and production processes they might use in their future work. We don’t, however, live in this ideal world. Even if there was time in the curriculum of undergraduate education to train students on all the potential printing and production processes they might face in the world beyond school, there are simply too many processes to make it financially feasible for any such institution. Compromises are made, and one compromise that seems to be frequently made is to let the print production education slide in favor of a stronger design background. Future employers can become responsible for teaching their specific production needs later on, or so the argument goes.

Part of the premise of this study is that a strong background in print production techniques and processes can be an asset to a designer, allowing them to save time and money for clients, as well as having the ability to stretch the printing processes to their limits, allowing for new possibilities in their designs. As future printing technologies become available, a designer with a strong background in the field can potentially push their designs
even further to take advantage of new processes available, like so many of the examples seen in the historical synopsis of this study's literature review.

This thesis looked at what students learn about print production and what they need to know from a variety of sources; from the students themselves in the form of a survey, from printing industry professionals who work with designer's files, from the results of a student exercise, from a case study in textile design education, and from software used in the printing industry to analyze electronic files submitted to printers. It would be nice to be able to say from the results of the study that there are one or two things that needed to be improved upon in order to provide students with a better background in print production during their university educations. That doesn't seem to be the case, however. Instead, there are certain patterns that can be identified giving hints as to what areas of the field need further emphasis in education. These patterns are outlined below.

In the beginning, this study looked at the preflight software MarkzWare FlightCheck to determine what some of the important constraints were for designers in the printing industry. The constraints, or Ground Controls, as MarkzWare calls them, were used to help establish a list of important criteria that would eventually become surveys sent to students and printing industry professionals.

From the survey sent to graphic design students, there were several important discoveries made. In answering which topics in a print-production course students felt were most relevant to them and their future, students rated setting up documents, using fonts, and understanding different graphics formats, as well as photography, scanning, and color issues as the most important to them. Other topics rated highly as well, and as such should not be discarded, but those were the two most highly rated answers. In a second question, when
students were asked to evaluate three exercises they had completed during the course, they rated the two exercises that involved setting up files for a print job (one theoretical, the other practical) almost identically. Far below that, they listed an exercise involving choosing paper for a job.

The final part of the student survey asked students to choose between the different teaching and evaluation methods used during the course. Almost overwhelmingly, they selected in-class exercises and class projects far ahead of lectures, guest speakers, quizzes, and exams.

The above feedback gives a certain insight into what students feel is important in their education. The next step asked printing industry professionals to answer questions as to how common certain problems were in their daily work. These problems were identified based on the Ground Controls from FlightCheck as well as relating to the questions posed to the students. Results varied widely on the professional survey, but, again, there were several categories that were clearly rated as being more problematic than others. The problems rated the most common were missing elements and missing files, or errors with particular file formats. Color issues and proper color formats like color space and proper separations also rated highly. In addition, a lack of understanding of a particular printing press or output device was cited as a source of problems on the professional survey.

When comparing the results from the two surveys, it is interesting to see how many of the same topics were comparable. Problems with file formats and document setup were listed both by students and the professionals. So too were color issues. There is certainly some common ground between the two results.
The case study in textile design education looked specifically at how the Department of Textiles and Clothing at Iowa State University addressed the issue of teaching production skills to their students. A strong comparison was made to how graphic design is taught, and how the two fields have evolved similarly with regards to changes in printing technology. A course in digital apparel design was looked at, with its strong project-based curriculum providing some insights as to how a graphic design course in print production could develop.

The final set of data collected during this study were results from the Studio Collaborative Project conducted during spring semester 2004 in a pilot-course in print production called ART GR 372 at Iowa State University. This project involved 54 students who completed a design intended to be printed on an offset press. The files submitted to the instructor were examined for their print-readiness. Any problems that could cause output errors or scheduling errors were noted as the files were being prepared for the press. Of the many problems noted, the most prevalent were missing files or incorrect file formats, color space issues and problems with color separations, and bleed and page setup issues.

From all the data collected, several recommendations can be made. First of all, it would seem that from student feedback, a course in printing and production techniques should include more hands-on exercises and projects and less lecture time and guest speakers. While these may still need to be a part of the course at this point, the ideal course in printing methods—given the time and budget constraints noted—would be better served if some short projects could be integrated into the curriculum. From the results of the surveys and project feedback, some of the areas of focus for a series of exercises are outlined in Table 5 on the following page.
<table>
<thead>
<tr>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting up documents, including page setup, bleeds, etc.</td>
</tr>
<tr>
<td>Use of fonts and graphics formats/missing images and links</td>
</tr>
<tr>
<td>Photography, scanning, and use of color</td>
</tr>
<tr>
<td>Color space and separations</td>
</tr>
<tr>
<td>Printing output devices</td>
</tr>
</tbody>
</table>

While these came in time and time again as the most important topics to students and deemed important to professionals, other topics should not be disregarded or de-emphasized in addressing the above topics. Still, based on the all of the results of the different aspects of this study, it is the conclusion of the author that a good place to start in designing a better way of teaching print-production methods for graphic design undergraduate students is a series of short projects or exercises emphasizing the topics noted in Table 5, integrated into an existing or developing lecture course.
CHAPTER 9

RECOMMENDATIONS

The recommendations given for this thesis are not intended as a complete course in print-production methods. That was never the intention of the study. This chapter includes several recommendations that have been reached through the results of the study as to how an existing lecture course in printing and production methods can be enhanced to be more inline with the studio-based education graphic design students are accustomed to.

Any course designed to teach print production would need to include certain topics. While the list of those topics could vary based on the emphasis of the course, a basic list of topics would need to include those discussed in this study, namely the constraints within the FlightCheck application as well as the topics listed in the student survey discussed in chapter 4. From Figure 2, here again are those topics from the student survey:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic (a)</td>
<td>Planning Jobs, Dealing with Printers, and Specifying Jobs</td>
</tr>
<tr>
<td>Topic (b)</td>
<td>Setting up Documents, Using Fonts, Graphics formats</td>
</tr>
<tr>
<td>Topic (c)</td>
<td>Photography, Scanning, and Color</td>
</tr>
<tr>
<td>Topic (d)</td>
<td>Paper</td>
</tr>
<tr>
<td>Topic (e)</td>
<td>Prepress</td>
</tr>
<tr>
<td>Topic (f)</td>
<td>Offset Printing</td>
</tr>
<tr>
<td>Topic (g)</td>
<td>Specialty and Digital Printing</td>
</tr>
<tr>
<td>Topic (h)</td>
<td>Bindery and Finishing</td>
</tr>
</tbody>
</table>

The list of topics is very broad and non-specific. Certain courses might spend more time on prepress operations, for example, or much more time on color issues which might mean other topics need to be removed from the list. It is, however, a good starting point in planning topics for a course in print production.
What follows, then, are five short projects that could be added as assignments in a course on print production. These are meant to be guidelines, and as such should be tailored to meet the requirements of the program they are being added to. They have not been tested in any way, they are simply recommendations based on what was observed during this study, and it is hoped that they would help students learn some of the fundamentals of printing and production methods. Each of the five short projects cover different topics that were deemed as needing further emphasis in such a course. Due to the nature of the printing process, however, these projects are not without redundancies between them. The first short project asks students to set up a document as an electronic file with a variety of constraints given. This is to help with the oft-cited error of not having the page layout document set up correctly. The second short project deals with color correction of an image, a topic that is generally discussed but usually requires practice to perfect. The third short project asks students to set up a file for two-color printing. This will take the first short project further and emphasize the concept of color separations. The fourth short project deals with difference in designing for different printing and output devices. The fifth and final short project brings everything together in asking students to design a project for offset printing and covers most topics in the list above.
RECOMMENDED PROJECT 1:
DOCUMENT SET-UP

Overview: This project stresses the importance of setting up a document correctly in a page layout program.

Related Topics: Document set-up, page bleeds, fonts, pagination.

Directions: This quick project introduces students to the importance of using the correct software tools for a print job. Being the first project, it does not involve the use of graphics of any sort. In this project, the instructor should stress the importance of using the proper software for its proper job (i.e. graphics and illustrations in a drawing program, photos in photo editor, and documents in a page layout program.) Assign the students to set up a four-page booklet using facing pages in a page layout software application. Students should number the pages one through four and be explained the difference between printer’s spreads and reader’s spreads. Ask the students to add a number of elements to the pages such as color boxes and some text. Explain to the students how a bleed works and indicate that at least one element on the page should bleed. Any fonts used on the page should be included on disk or on the server when the files are turned in for grading.

Evaluation Criteria: Did the students set the document setup in the page layout application correctly? Are they using facing pages? Are all used fonts included with the files? Were files submitted according to requirements? Are the bleeds set up correctly?

Accomplishments: This exercise, while brief and fairly straightforward, will be built upon in later exercises. It is important that students get a good understanding of the importance of using the right tool at the right time and begin to develop a feel for submitting jobs to printers.
RECOMMENDED PROJECT 2:
COLOR ADJUSTMENTS

Overview: This project introduces the students briefly to the world of color adjustment in images. While this is a broad topic, this project will give a quick introduction by giving students an image to analyze and color correct.

Related Topics: Photography, scanning, color adjustments.

Directions: This project can be extended as far as the instructor is inclined. Some demonstrations in class on adjusting images for contrast, tonality, and the introduction to using a levels histogram would be helpful prior to this project. Students should be given access to an image that obviously requires adjustment. This image could be stored on a file server or Web site that the students can access and download. The image could be a flat grayscale image or one with color that has poor, inaccurate color. Students should then color correct the image and submit a high-quality printout of both the before and after image.

Evaluation Criteria: The way this project is specified, there is no right or wrong answer, just varying degrees of success in the results, all of which would be very subjective. Instead of simply looking at the images, the instructor should require students submit a step-by-step list of procedures they used to adjust image quality and grade based on method.

Accomplishments: This project is intended to give students practice in the art of color and image adjustment. The project could be expanded by requiring a second part requiring students scan or photograph their own subjects, and then make adjustments based on the quality of the original scan.
RECOMMENDED PROJECT 3:
PREPARING FILES FOR TWO-COLOR PRINTING

Overview: This project serves as an introduction to two-color printing.

Related Topics: Color, separations, document setup, graphics formats.

Directions: Students should create new document in a page layout application. On this page they should place two images, one a photo that has been converted into a duotone, and secondly an illustration or logo that will separate properly into two colors. In addition, students should create several blocks of color that are set to varying tints of the two spot colors. If the duotone image needs adjustment, students should take it upon themselves to color correct the image. Students should submit test separations of the final page as well as files on a disk or server location.

Evaluation Criteria: Grading should be based on whether the spot colors are set up properly for offset printing (will they separate properly?), whether the duotone is created correctly, and whether the document has extra colors. All images need to be checked for proper color usage.

Accomplishments: At the end of this project, students should have a better understanding of spot color printing and how color separations work.
RECOMMENDED PROJECT 4:
DESIGNING FOR DIFFERENT OUTPUT DEVICES

Overview: This project is intended to show students some of differences that are inherent in designing for different output devices.

Related Topics: Printing devices.

Directions: Students should be given a design that they need to modify to better fit in with digital printing techniques. The present design would have multiple blends, bleeds, and images that have been overly adjusted for dot gain, to name a few problems. Students would be asked to redesign this layout so as to better print on a digital printer.

Evaluation Criteria: There are a finite number of corrections needing to be made. Students should make those corrections and justify why they need to be made.

Accomplishments: Being able to design with a particular output device in mind will help to minimize problems at print time. Students need to understand this and be able to take advantage of a particular printing device’s advantages while being aware of its limitations.
RECOMMENDED PROJECT 5: DESIGNING FOR OFFSET PRINTING

Overview: Students will design a postcard introducing themselves as designers to potential employers. The postcard will be set up as if it was being printed on an offset press using four-color process on one side and two spot colors on the other. This should be treated as an actual print job and is the culmination of all previous exercises.

Related Topics: Document setup, bleeds, fonts, graphics, color, printing devices.

Directions: Each student will need to design their own personal identity postcards. It is important to note that the design is not what is important in this exercise. The front of the postcard needs to be set up for four-color printing, meaning all photos need to be set up as CMYK images and color adjusted for particular press requirements. The back should be set up in two predefined spot colors. All elements such as page layout, bleeds, font inclusion, image resolution, etc. will be used to evaluate the print-readiness of the design.

Evaluation Criteria: A long checklist of items should be prepared for grading the projects. Criteria includes: page setup, bleeds, fonts, graphic color space, graphic resolution, two-color separations, etc.

Accomplishments: This project brings together all of the previous exercises and gives the students almost real-world experience. If possible, coordinate with a local printer to physically print the final product.
APPENDIX I

STUDENT SURVEY

A Study of Print and Production Teaching Methods for Graphic Design Students
ART GR 372 POST-COURSE SURVEY

1. Please indicate your gender below
   □ MALE  □ FEMALE

2. Listed below are the general topics covered in the course. Indicate whether you feel the topic is: (1) not very important, (2) somewhat important, (3) uncertain, (4) important, or (5) very important:
   a. Planning Jobs, Dealing with Printers, and Specifying Jobs
      □ 1  □ 2  □ 3  □ 4  □ 5
   b. Setting up Document, Using Fonts, Graphics formats
      □ 1  □ 2  □ 3  □ 4  □ 5
   c. Photography, Scanning, and Color
      □ 1  □ 2  □ 3  □ 4  □ 5
   d. Paper
      □ 1  □ 2  □ 3  □ 4  □ 5
   e. Prepress
      □ 1  □ 2  □ 3  □ 4  □ 5
   f. Offset Printing
      □ 1  □ 2  □ 3  □ 4  □ 5
   g. Specialty and Digital Printing
      □ 1  □ 2  □ 3  □ 4  □ 5
   h. Bindery and Finishing
      □ 1  □ 2  □ 3  □ 4  □ 5

3. Rate the following assignments as far as their usefulness, especially taking into consideration their real-world applications. Indicate (1) for NOT effective at all, (2) for SOMEWHAT effective, (3) for UNCERTAIN, (4) for EFFECTIVE, and (5) for VERY effective.
   a. Short Project 1, involved setting up a 2-color file for print
      □ 1  □ 2  □ 3  □ 4  □ 5
   b. Short Project 2, involved specifying a paper for a list of criteria
      □ 1  □ 2  □ 3  □ 4  □ 5
c. Postcard Project, setting up files and having them printed using offset lithography

1  2  3  4  5

4. Rate the following teaching and evaluation methods used in this course as to what you feel are the most effective ways to teach the topics addressed in this course. Indicate on the scale below, with (1) for NOT effective at all, (2) for SOMEWHAT effective, (3) for UNCERTAIN, (4) for EFFECTIVE, and (5) for VERY effective.

a. Lectures and classroom discussions

1  2  3  4  5

b. Guest speakers and guest presenters

1  2  3  4  5

c. Class projects and exercises (including the postcard project)

1  2  3  4  5

d. Quizzes and Exams

1  2  3  4  5

5. Do you have any suggestions for this course?
APPENDIX II

PROFESSIONAL SURVEY

A Study of Print and Production Related Problems for Printing Professionals

1. Background Information
   a. How many years have you worked in the graphic arts industry?

   b. What type of printing does your company specialize in (check all that apply):
      - Offset printing (4 or more colors)
      - Offset printing (4 colors or less)
      - 1- or 2-color printing
      - Short run 1-color and black and white printing
      - Digital printing
      - Large-format printing (plots, banners, etc.)

2. Listed below are some common problems that have been identified for print jobs. Indicate how often, in your experience, the problem occurs. Feel free to elaborate on any of these questions if you wish.

   a. Job doesn’t match specifications or estimate resulting in additional cost.
      - Never
      - Rarely
      - Sometimes
      - Often

   b. Job created using incorrect file formats (e.g., JPEG vs. TIFF).
      - Never
      - Rarely
      - Sometimes
      - Often

   c. Client’s application is not supported (e.g., MS Publisher, Word, CorelDraw).
      - Never
      - Rarely
      - Sometimes
      - Often

   d. Job is missing elements (e.g., fonts, graphics, etc).
      - Never
      - Rarely
      - Sometimes
      - Often

   e. Improper resolution for images.
      - Never
      - Rarely
      - Sometimes
      - Often

   f. File is too complex to process (e.g., Illustrator files won’t RIP).
      - Never
      - Rarely
      - Sometimes
      - Often

   g. Job is set up incorrectly for size, bleeds, and/or fold considerations.
      - Never
      - Rarely
      - Sometimes
      - Often
h. Job is set up in an improper color space (e.g., RGB vs. CMYK, does not separate properly for multicolor work, multiple Pantone color names, etc.).
   □ never □ rarely □ sometimes □ often

i. Color issues relating to poor color management, lack of understanding of dot gain and other color reproduction problems (e.g., improper ICC profiles).
   □ never □ rarely □ sometimes □ often

j. The customer uses the proofing stage for correction of typos and other errors that should have been addressed before submitting the job.
   □ never □ rarely □ sometimes □ often

k. The customer doesn’t understand limitations and the effect of different paper finishes and colors on the final printed piece (e.g., color shift, ink absorption).
   □ never □ rarely □ sometimes □ often

l. The customer fails to understand the limitations of the process relating to the press or output device.
   □ never □ rarely □ sometimes □ often

m. Client’s design does not meet postal regulations.
   □ never □ rarely □ sometimes □ often

3. Briefly describe any steps (if any) you have taken to educate your clients in order to reduce problems such as those listed above?
The focus of the course will be on how to use CAD tools to design and develop textile and apparel designs. Elements of woven, knit, and print design will be explored, as well as illustration, flat sketches, and 2D-3D texture mapping. Topics to be discussed will include:

- understanding how designs are applied to fabric,
- visual design issues in relation to apparel and the human form,
- how the industry uses computer integrated technology,
- what to expect when entering the apparel industry with CAD skills.

Requirements: NO LATE WORK IS ACCEPTED.

There will be four main design projects and two smaller assignments:

- Project 1 = ........................................................... 200 pts.
- Project 2 = ........................................................... 200 pts.
- Project 3 = ........................................................... 200 pts.
- Project 4 = ........................................................... 300 pts.
- Stamp assignment = ............................................. 20 pts.
- Critical Review assignment = .................................. 20 pts.

Total Points Possible = ........................................... 940 pts.

Grades for the course are figured on a traditional scale:

- 90 - 100 = A
- 80 - 89 = B
- 70 - 79 = C
- 60 - 69 = D
- 59 and below = F
TC 321 PROJECT # 1: Designing for traditional print methods. Name:

For this project, you will be developing a line of textiles that are geared for the traditional rotary screen printed fabric market. You may choose to develop a collection geared towards interior fabrics, apparel, or special use markets (such as hospital wear, equestrian clothing, etc.). The collection should be well resolved and should include at least six different, but coordinated print designs. Pay special attention as to how a collection of textile designs can be perceived: the type of imagery that you work with should work well together and be appropriate for your target market. You WILL be asked to justify how your designs address the needs of your potential customer.

The final presentation of this collection will be informal, but you should be prepared to "sell" your designs to the class. We will be discussing how textile designs might be sold in the industry.

In preparation for this project, you will need to hand paint or draw at least one textile design (of at least 8" x 8", in color), which you can scan in to use as a starting point for your collection. You must also scan at least one fabric as part of your initial imagery to work with.

GRADING GUIDELINE: (this sheet must be handed in with the project with your name at the top)

Textile design:

There are 5 separate print designs ............................................................................................................... /40pts
The composition of these designs is exciting and appropriate for the market.

The designs are clean and are in a perfect repeat ............................................................................................. /20 pts

Each design must include no more than 6 colors if apparel, or 12 if for the interiors market ............... /10 pts

Each design must be available in at least 3 different colorways ..................................................................... /20 pts
each of which is resolved and could be sold individually, if needed.

Product Prototypes:

Create a collection/line of prototype products that the textile designs could be used in.

3 complete products illustrated as flat/technical sketches, filled with print designs ..................... /30 pts

3 illustrated figures, rendered with print design concepts ..................................................................... /30 pts

Presentation Method:

All printed swatch/samples are labeled and presented in a professional format ..................................... /10 pts

Cleanliness ..................................................................................................................................................... /5 pts

Clarity of presentation .................................................................................................................................. /5 pts

Overall flow or mood and how individual designs work together ............................................................. /10 pts

TOTAL ......................................................................................................................................................... /200 PTS
For this project, you will be developing a line of textiles that are geared towards the possibilities of digital textile printing. There are no limits on this project, except that you must come up with at least 3 fully resolved designs that illustrate the types of designs that can be created digitally and how they are different from traditionally printed fabric designs.

The final presentation of this collection will be informal, but you should be prepared to show how your designs address some unique aspects of digital printing.

In preparation for this project, you will need to photograph something that interests you visually. Take at least 24 pictures. You must begin your project by using the scanned images from the photographs that you have taken. So be sure to find interesting topics and really use the camera as a new set of eyes, a new way of looking at the world.

**GRADING GUIDELINE:** (this sheet must be handed in with the project with your name at the top)

**Textile design:**

There are 3 separate print designs ................................................................./90 pts

The designs should be exciting, should effectively demonstrate understanding of the potentials of digital textile printing and should be appropriately designed and scaled for their intended output.

- any scale is acceptable
- the images can be repeating or non-repeating
- you choose the resolution and file size

**Product Prototypes:**

Create a collection/line of prototype products that the textile designs could be used in.

3 complete products illustrated as flat/technical sketches, filled with print designs ....................../30 pts

3 illustrated figures, rendered with print design concepts ................................................................./30 pts

**Presentation Method:**

All printed designs are labeled and presented in a professional format ........................./20 pts

Cleanliness ....................................................................................................................../10 pts

Clarity of presentation ......................................................................................................../10 pts

Overall flow or mood and how individual designs work together ................................/10 pts

**TOTAL** ....................................................................................................................../200 PTS
For this project, you will be developing two placed knit designs, two edge knit designs, and one repeating knit design. You will also be creating at least two woven simulations and one true woven design (using Magic Cloth). The final presentation of this collection will be informal. Your knit and woven designs must be presented at 100% scale and also filled into flats or croqui illustrations at the appropriate scale. Assume that you are creating all of your designs to be shown together. Coordinate your fabrics and colors so that they will work together well in one collection of garments.

In preparation for this project, you will need to bring in some examples of knit fabrics or garments to use as your initial inspiration. Do not scan the fabrics, but instead, use something about the physical structure to inform your designed creations.

**GRADING GUIDELINE:** (this sheet must be handed in with the project with your name at the top)

**Knit design:**
- Two placed knit designs: ............................................................................................................................ /20 pts
- Two edge-knit concepts: .............................................................................................................................. /20 pts
- One repeating knit concept: ....................................................................................................................... /10 pts

**Woven design:**
- 3 woven simulations: ................................................................................................................................ /30 pts

**Product Prototypes:**
Create a collection/line of prototype products that the textile designs could be used in.
- 3 complete products illustrated as flat/technical sketches, filled with print designs ......................... /30 pts
- 3 illustrated figures, rendered with print design concepts ....................................................................... /30 pts

**Presentation Method:**
- All designs are printed as one unrepeated unit at 100% scale: .............................................................. /20 pts

**Cleanliness** ............................................................................................................................................. /10 pts

**Clarity of presentation** ............................................................................................................................ /10 pts

**Overall flow or mood and how individual designs work together .......................................................... /20 pts

**TOTAL ......................................................................................................................................................... /200 PTS**
TC 321 FINAL PROJECT GRADING CRITERIA:

You are to design a line (collection) of textile products, such as clothing, bedding, furniture and upholstery, curtains, etc. Choose one category to design for and then develop a written proposal for the project that will include sketches/illustrations. The proposal should be no more than 3 pages including images.

The collection should be very well resolved and presented in a refined and professional manner. All of the components of the line will be designed by you. You will need to show the textiles and textile designs used, flat illustrations of all of the pieces in the line (front and back), and a texture mapped/draped image of three of the pieces in the line with one of the fabrics that you have created.

GRADING GUIDELINE:

Written Project Proposal: 
A. Typewritten with sketches/illustrations included ................................................................. /20pts

Textile design: 
Printed designs ...................................................................................................................................... /60pts
Create at least three, with two colorways each

Woven/knit designs ................................................................................................................................ /20pts
Create at least one technically correct woven or knit fabric design must be used to complement the other fabrics in the line.

Flat illustrations: ..................................................................................................................................... /40pts
All pieces in the line must be shown in a technical flat illustration (front and back view, if needed). There must be at least four pieces in the line. The flat illustrations are filled with a fabric and the scale is appropriate for the design and are clear in their presentation.

Texture mapping: ................................................................................................................................... /90pts
3 of the pieces in the line must be textured mapped with one of the fabrics that you have created. The image can be your own illustration or a photographic image. If it is a photographic image, the product should very closely resemble your own designs.

Presentation:
Critique Presentation: ............................................................................................................................ /20pts
The professional/oral presentation is well developed and informational.

Peer Evaluation: ..................................................................................................................................... /20pts
The group assigned to evaluate your product line and presentation has awarded you

Presentation board/portfolio: .................................................................................................................. /30pts
The presentation board/portfolio is clean, effective, and exciting

TOTAL ................................................................................................................................................... /300PTS
APPENDIX IV

CLASS EXERCISES FROM ART GR 372, SPRING 2004

SHORT PROJECT 1

Due Date: Tuesday, February 27th

To turn in:
1. Completed file on CD or ZIP disk with all associated links.
2. Completed Specifications worksheet.
3. Color composite proof
   * enclose all of the above in an envelope clearly marked with your name.

Project Overview

This short project will introduce you to 2-color jobs. You will be asked to create a simple layout using a variety of elements set up in their appropriate programs so that they are print-ready. In other words, the file(s) you turn in should be able to be printed on a 2-color offset press immediately, with little or no work needed to be done to prepare the files for print. You will be graded based on the technical merit(s) of these files – you will not be graded on design.

The Project

Step 1: You need to create a single page layout in Quark, PageMaker, or InDesign. This can be any page size from a minimum of 3"x5" up to a maximum page size of 8.5"x11". As this is a single page layout, do not use lacing pages in the page layout program. The final page layout file should not have extra colors in it beyond the default colors (i.e. do not have 2 versions of one color such as PANTONE 286 C and Pantone 286 CVU.)

Step 2: You need to create 3 images and place them in the page layout file. Again, design and concept are not important in this exercise, so don't worry about the content of the images. All three images will be in different 2-color formats, but should use the same 2 colors - Black and a spot color of your choice (choose from the Pantone library.) Make sure all files are the optimal resolution for printing on an offset press at 133 lpi. The three images should be created in the following formats (1 each):

1. A 2-color logo, symbol, or nameplate object graphic created in Illustrator or Freehand, saved in the appropriate format and placed in the page layout program.
2. A duotone, with the duotone gamma curves adjusted so the image is not too dark. Save in the appropriate file format and placed in the page layout program.
3. A multi-channel file created in Photoshop - set up 2 spot channels, black and your spot color. Create an image that utilizes these channels, save in the appropriate format, and place in your page layout file.

Step 3: Using your spot color in the page layout program, create 2 different box elements set to 2 different tints of the spot color.

Step 4: Set one line of display type (a headline for example) in the spot color at 100% tint of that color.

Step 5: Place some text type in 100% black (this can be any type, copy and paste in, content does not matter.)

Step 6: Have one element bleed off a minimum of one edge (this could be one of the tinted boxes or any image). Bleeds should be 0.125".

Step 7: Download the file SP1_Specifications from the class web site and fill it out completely.

Step 8: Copy files onto a disk (CD or ZIP disk are acceptable) and turn in along with the completed specifications form and a color composite proof of your finished file. The color composite proof can be a low quality ink jet print out, but should printed to 100% size including crop marks indicating trim of final piece and any sides that bleed should be clearly identified on this proof. Your disk should clearly identify your contact info and job title. Include all fonts on the disk. NOTE: composite images can be printed low res - the multichannel file, in particular, may print pixelated on the proof.

Grading Breakdown

<table>
<thead>
<tr>
<th>Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>File/Logo File</td>
<td>4 pts</td>
</tr>
<tr>
<td>Illustrator File</td>
<td>3 pts</td>
</tr>
<tr>
<td>Duotone Image</td>
<td>4 pts</td>
</tr>
<tr>
<td>Multi-channel Image</td>
<td>4 pts</td>
</tr>
<tr>
<td>Text Boxes</td>
<td>2 pts</td>
</tr>
<tr>
<td>Type</td>
<td>2 pts</td>
</tr>
<tr>
<td>Bleed</td>
<td>1 pts</td>
</tr>
<tr>
<td>Everything on Disk</td>
<td>1 pts</td>
</tr>
<tr>
<td>Specifications</td>
<td>2 pts</td>
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<tr>
<td>Composite Proof</td>
<td>1 pts</td>
</tr>
<tr>
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</tr>
<tr>
<td>Total</td>
<td>25 pts</td>
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</tbody>
</table>
SHORT PROJECT 2
Due Date: Thursday, March 25th
To turn in:
1. Written proposal (with both names on it.)
2. Sample paper swatch (attached to above)

Project Overview
This second short project will be an exercise in choosing a paper appropriate to a design job. As we have seen from the readings, choosing the right paper for a job will have an enormous influence on how the job looks. Cost, client, print quality, and type of printing used as well as the overall look and feel and intended purpose for a project will be affected by the paper you choose.

The Project
You will be given a list of criteria below and asked to choose a paper for that job. There is no right or wrong answer for this project, just choices that are more appropriate than others.

Based on the criteria listed below, work with an assigned partner to choose a paper. Use generalities from the readings and lectures; you need not be exact on pricing and quality issues. For example, we know that coated paper is more expensive than offset paper, so if you have a limited budget, you might not use the more expensive choice. We also know that a coated stock generally holds ink better than an uncoated stock, so if print quality is an important concern, you might consider using a coated stock. Also, the client and their specific concerns for the job may affect the selection.

What to do:
Choose a paper choice for your listed criteria and justify this choice in a concisely written paragraph. Include a sample swatch of the paper. [note: there are a lot of old swatch books lying around in various studios and people’s kitchens.] Your written statement should defend why you’ve chosen a particular basis and defend this decision against the listed criteria. It should be possible to do this entirely based on class notes and readings, but there are certainly other references available if you need them.

Your Criteria:
The Job: Invitation card for a holiday ball for a Fortune 500 company. Will need a corresponding envelope.
Budget: virtually $0... pretty tight... moderate... generous... unlimited
Quality: Must look very good; near-to-perfect reproduction of images
Printing: This job will be printed using offset lithography
Concerns: This invitation needs to look classy and elegant for this upscale ball.
Due Date: Thursday, March 25th

To turn in:
1. Files on disk
2. Specifications worksheet
3. Proof

Project Overview
This project is completed in conjunction with Art Gr 371. You will have the opportunity to have a postcard professionally printed. In order to keep costs on this project as low as possible, the postcard must meet specific requirements. These requirements are listed below. This project is a good opportunity to prepare files for press and actually see the results. Each student will receive about 100 copies of their postcard.

Project Requirements

Size: 5.5" x 4"
Colors: 4/2 (4 color process on front side; black plus a specified spot color on the back)
Paper: Cornwall Coated-1-side cover weight
Bleeds: OK on all edges, front and back.

For 372, you will be graded on the technical merits of the piece, not the design (that will be part of your 371 grade.) In other words, if your postcard is ready to print as submitted, you will receive more points that way. This will be similar to Short Project 1, with some important points listed below:

Important Considerations

Point 1: Your final design for the postcard needs to be in Quark or Indesign. IT MUST BE in one of these two programs.

Point 2: Set up your files to the FINISHED size of the piece. Don’t put them on an 8.5x11 page size or try and put 2 on a page.

Point 3: Because this is 4/2 colors, set up the postcard as 2 SEPARATE FILES, clearly named front and back. In the front file, make sure all colors are listed as process colors, while the back file needs to have the appropriate spot colors. Use CMYK TIFF files on the front and Duotones or multichannel DCS files on the back for any images you use.

Point 4: Unlike SP1, where we had specific requirements (such as use a duotone or 2 color logo), you will not have specific requirements for image formats on this card. Use whatever your design dictates. Considerations will be made on effective use of color.

Point 5: Make sure images are at the proper resolution. This will be printed at 150 LPI.

Submitting Files

1. ALL files need to be submitted on a CD or ZIP disk. Files include the page layout files, plus all placed images and all fonts used (printer and screen versions.)

2. FILL out a specifications worksheet (you can use the same one we used for SP1)

3. A proof is always welcomed by your printer.

4. PUT ALL OF THIS IN AN ENVELOPE OR FOLDER OR BOX OR PACKET OR BAG or something neat and orderly. There are 54 people so this needs to be done in an orderly manner.

Payment Information

Each student will receive 100 copies of their postcard. The final cost per student will be approximately $35. Payment information and exact cost will be available soon.
BIBLIOGRAPHY


Schmidt, Klaus F. “Printing for One.” *Print* 54, no. 3 (May/June 2000): 113-114.


ACKNOWLEDGEMENTS

As with any work of this magnitude, writing this thesis took many turns throughout its development. Having taken a year longer than originally planned, it is with great relief and satisfaction that I write this final page.

I never would have been able to complete this work without the help and support of many people, some of which I will attempt to name here, and others of which will have to know they are listed in other places, not the least of which are within my heart and mind.

To my parents, John and Judy Jourdan, who were always supportive of what the IRS now calls “a lifetime learner,” I give my heartfelt thanks.

To everyone at Iowa State University Printing Services, where I went to work “for a year” and stayed for eight, I am thankful for all the help and for the tolerance in my erratic work schedule the past few years. In particular, Ken Burditt, Rob Louden, and Lana Voga helped immeasurably in the various stages of this work. And to Gary Boyd, who was kind enough to let me “quit my job” about three times in order to pursue my graduate degree.

Of course my thesis committee deserves to be on that list, particularly Deb who put up with my cynicism and sarcasm for years and seems to have come through it unscathed.

The late nights spent staring idly at the computer screen would not have been the same with my dear friend Bud, who was gracious enough to come up for plenty of visits (mostly in search of food) and who provided me with many much needed moments of distraction.

And finally, thanks to all the friends and family members for support and assistance during the past few years. Jokes about the length of time spent in pursuit of this degree notwithstanding, the journey wouldn’t have been the same without each one of them.