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Hardware and Software Requirements for Graphic Designers

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HARDWARE AND SOFTWARE REQUIREMENTS FOR GRAPHIC DESIGNERS

By

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APPROVAL PAGE

This Independent Study, submitted by Denise M. Patterson in partial fulfillment of the requirements for the Degree of Master of Science, Industrial Technology, from the University of North Dakota, has been read by the advisor under whom the work has been done and is hereby approved.

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Date July 26, 2000

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"They that wait upon the Lord shall renew their strength;

they shall mount up with wings as eagles;

they shall run, and not be weary; and

they shall walk, and not faint."

(Isaiah 40:31 KJV)

CHAPTER I

INTRODUCTION

Since the beginning of time, communication for humankind has involved the use of symbols and drawn pictures. From cave paintings to murals on a wall, every picture has had a story to tell. People used these symbols and pictures to represent ideas, services, and products they wanted to make available to others. As time passed, these people tried to document their stories and pictures by writing them down on paper and in books. These stories were transferred from book to book, by hand, so that more people could learn to read. But because of the length of time needed for this transfer, only the people of status and rank could afford to buy these articles. Those of lower status and rank depended on the wealthy to convey the book's story to them. As humankind's ability developed through the written word and drawn pictures, so did the ability to create ways to duplicate these images faster and more precisely. This desire to communicate faster and to communicate to people farther away led to the development of computers and other communication systems that are described in the following time line of important events in history.

c. 2500 BC - The Egyptians used hieroglyphs, a form of writing that uses symbols to represent ideas and objects.

c. 1200 BC - The Phoenicians develop one of the first alphabets.

400 BC - Early merchants in China develop the abacus, a rack with beads that can be pushed from one side to another, to calculate. The abacus can be considered the first computer.

AD 1440 - Johannes Gutenberg invented the first printing press. Printed materials can now be reproduced without having to spend days or weeks copying them by hand.

1460 - Woodcuts are first used to print illustrations.

1494 - The Aldine Press, one of the first book publishing houses, is founded in Venice, Italy.

1558 - The camera obscura, an early version of a camera, is developed by Italian scientist Giambattista della Porta.

1603-1610 - The first newspapers are published in Europe and Asia.
1597 - After publishing about 908 works, the Aldine Press closes its doors.
1638 - One of the first printing presses in North America is built in Massachusetts.
1729 - Benjamin Franklin establishes his own printing company and begins to publish the *Pennsylvania Gazette*.
1770 - Over a dozen print shops are in business in Boston.
1814 - Workers at the *Times* of London begin using a steam-powered printing press.
1822 - Dr. William Church invents a typesetting machine. Up to this time, type had been set by hand.
1834 - Inventor Charles Babbage develops the concept of the analytical engine, the basis of the computer.
1884 - The Linotype typesetting machine is invented by Ottmar Mergenthaler. This machine is the first to set one line of characters at a time instead of just individual letters.
1889 - George Eastman invents the Kodak camera, which makes photography more accessible to the average person and increases the popularity of amateur photography.
1939 - IBM builds its first computer.
1959 - Transistor technology is first used to make computers faster and more dependable.
1974 - The first personal computer, or PC, called the Altair, is developed.
1984 - Apple Computer introduces the Macintosh, the first computer to use a graphical user interface (GUI). This allows users to give instructions to the computer using graphics rather than words.
1985 Microsoft launches Windows, the first system other than the Macintosh operating system to use a GUI.
1989 - The World Wide Web is created. It helps computer users get access to information on the Internet, a vast network of computers.
1993 - Mosiac, the first Web browser, is introduced. It gives computer users access to the World Wide Web through a GUI.

As this time line illustrates, the history of graphic arts is in large part the history of new technological innovations - the printing press, typesetting machine, camera, and computer. One development has led to the next. Right now, the computer is both the present and the future of graphic art, creating both new possibilities and new jobs for graphic artists (McGuire-Lytle, 1999, p. 3-5).

The development of computers has provided an ever increasing supply of information, computer hardware, and computer software available to the consumer. With these developments of new technology, the decision to choose the best suited hardware and software needed for graphic design has become difficult.

PROBLEM STATEMENT AND OBJECTIVES

The problem of this independent study was to determine hardware and software available to the person specifically interested in graphic design. Additionally, this study was to determine what graphic

design programs and platforms are currently used in the industry and what the anticipated needs will be for the future.

OBJECTIVES

The objectives of this study were to:

1. Conduct a survey of graphic design businesses to determine needs from current and anticipated programs and platforms.
2. Conduct a survey of business and educational institutions offering classes in graphic design.
3. Provide a description of current and future needs of hardware and software used for graphic design in businesses.
4. Provide a description of current hardware and software used in business and educational institutions.
5. Provide a plan that is based upon the findings of this study and the recommendations made by the researcher that will open communication lines between the businesses and the universities.

LIMITATIONS

This study will be limited to:

- The businesses in the Grand Forks area and the universities in the region surrounding Grand Forks.

DEFINITION OF TERMS

Computer Graphics - the transfer of pictorial data into and out of a computer. Using analog-to digital conversion techniques, a variety of devices connected to graphics computer terminals can be used to store pictorial data in a digital computer. These devices can include curve tracers, digitizers (digital cameras and scanners), and light pen (2000, Encyclopedia.com)

Design - The arrangement of elements that make up a structure or a work of art (Woolf, 1974, p. 20).

Desktop Publishing - personal computer system that sets type, combines it with art, and prints the result. This printing can serve as a camera-ready copy for an offset press (Nelson, 1991, p. 306).

Digital Camera - A Camera that photographs like a regular camera but does not need a developing process. The pictures can be downloaded on to a computer directly from the camera (2000, AOL.com).

Element - Copy, title or headline, art, rule or box, border, spot of color - anything to be printed on a page or spread (Nelson, 1991, p. 306).

Graphic - A graphic representation (as a picture, map, or graph) used especially for illustration (2000, AOL.com).

Hardware - Refers to the physical components of a computer system (Wolfe, 1974, p. 325).

Hard Drive - Storage unit that will store all data and programs (McGuire-Lytle, 1999, p. 123).

HTML - Hypertext Mark-Up Language, or hypertext, is the basic language on Web documents and pages. HTML enables Internet users to navigate from one site to another (McGuire-Lytle, 1999, p. 39).

Internet - is a connection between networks. The Internet is a WAN (wide area network) that connects thousands of disparate networks in the U.S., Canada, Europe, and Asia, providing global

communication between nodes on government, educational, and industrial networks (2000, Encyclopedia.com).

Layout - An arrangement of each of the elements in the design (copy, illustrations, photographs, logos, or other symbols) (McGuire-Lytle, 1999, p. 10).

Logo -Logotype (Woolf, 1974, p. 413).

Logotype - An identifying symbol (as for advertising) (Woolf, 1974, p 413).

Rough Draft - Is an outline for the design that shows that the artist has a clear understanding of the client's needs (McGuire-Lytle, 1999, p. 11-12).

Software - The programs, data, routines, etc. for a digital computer (Guralnik, 1984, p. 1353).

Typography - The appearance and arrangement of type (McGuire-Lytle, 1999, p. 124).

Typesetting - The preparation of type for printing (McGuire-Lytle, 1999, p. 124).

World Wide Web- An Internet electronic network of information that connects computers around the world and presents information in a friendly hypertext format. WWW can handle items other than text pages, such as query items let you type in words to search for and text files that can contain text, pictures, and sound (Levine, 1994, p. 79 & 100).

CHAPTER II

REVIEW OF LITERATURE

Graphic designers are individuals who take their knowledge of the fundamentals of art history and techniques and use them to increase their creativity in the work environment. Careers in graphic design can extend a wide scope of opportunities that might include working in a retail store designing displays, teaching courses in crafts, working for local museums, or working in the graphic design industry through a local advertising or printing firm. Graphic designers look for different ways in which the work environment may provide the use of additional tools or machines to help them increase personal productivity. One of these tools is the computer.

Before the present needs of the graphic design industry can be determined, one must look to the past to understand the evolution of graphic design. As stated in the introduction, the time line delineated how technology has developed to what we have today. That still doesn't explain how we came to know what elements are important in a graphic design and how to place them together to convey one complete message. These elements include names, company logos, company mission statements, text styles, text sizes, knowledge of color theory, and pictures.

As a team of graphic designers approach a project, the team comes together to discuss the project and to begin brainstorming for ideas. Questions are asked to determine the message. Who is the client? What is their logo? What is the color of the logo? What colors should be used in the project and should they matching the colors in the company's logo? Where is the company located? What is the product, service, or idea that is being sold? What is the company's mission statement?

Do they want this information in the message? How should these items be placed in the message for the best results? How does the appearance of these items add or subtract from the total message? How can they be improved?

Once these questions are answered, then the team can turn to production. First, graphic designers will sketch out small, quick drawings called thumbnail sketches. Thumbnail sketches do not include a lot of detail, for the designer is trying to document all brainstorming ideas quickly. Once completed, the designers returns to the thumbnail sketches to delete unusable sketches and adds more details to those considered usable. These rough drafts are then drawn larger and in greater detail so the designers can go back to the client for feedback. All this takes time and patience, since the client may choose not to accept any of the designers' ideas, thus sending the designers back to brainstorming for more ideas.

When the client decides on the best ideas or specific elements, the designers can incorporate these elements together with background colors, hand drawn pictures or photographs, font styles and sizes to create a finished project. These elements are then taken to the layout artist who decides where on the page they would make the most impact. The project moves from there to the paste-up artist who measures, positions, and pastes the elements into the design to allow for margins and other formatting elements. As soon as the elements are in place, the project or proof is then sent to the client who checks the project for errors (proofing). The client will either send it back with corrections or else give the approval so that the project may move on to production. When the client approves the final project, the image is photographed and the product is called a camera-ready copy prepared for the printing of multiple copies in newspapers, magazines, billboards, and even used in television advertisements.

Contemporary graphic designers continue to follow this step by step progression of development to reach a final product by ensuring that the process is thorough and precise to eliminate

any chance of error. Yeich (1998) provided a list of steps that included these elements of design so that the process would ensure a smooth workflow:

1. Everyone involved with the project meets to discuss the details before production begins.
2. Designer receives text elements, then creates art, images, and (when applicable) layout files.
3. Project is sent through the approval process and returned to designer for corrections.
4. After designer makes changes, client signs off on the project.
5. Project is sent to sales and customer service reps at the printing facility.
6. Final prepress round of production is performed. Prepress prepares file with high-res images swapped during OPI imaging, then pulls a color proof.
7. Proof is approved by customer, art director, and sometimes designer.
8. Changes are made where necessary, and a final color proof is pulled.
9. Final approvals are given.
10. Where applicable, file is distributed via PDF for printing at another facility. For printed media, file is RIPed and either fil-to-plate or computer-to-plate routine is generated.
11. Printing plates and project moves onto the press.
12. Project is printed and delivered to the customer (p. 53).

With the introduction of computers, graphic designers found that they spend less time at the drawing table and more time at the computer doing a lot of the positioning of elements on their own without having to transfer the project to a layout artist or a paste-up artist. This ensures that the project will be more successful without errors made by additional people who are involved with the project.

How Computers Influence Graphic Designers

At first, the computer was designed for text documents only and limited the user to Command-Line Interface (CLI). Command-Line Interface is based upon the fact that commands are given to the computer by typing them in line by line on the command line. With the development of the Apple Macintosh Computer (MAC) and it's Graphic Users Interface (GUI), users were able to communicate commands to the computer in a much easier fashion. With the GUI interface, many of the commands or programs were represented by a pictorial icon which can be accessed simultaneously with other

options. With the aid of a hand held device, called a mouse, the user can control the movements of an on-screen arrow by rolling the mouse across the desktop. The user can then choose the pictorial icon command options by pointing the arrow at the command picture and by clicking a button on the mouse to select it. This procedure is also referred to as the point and click interface (Burger, 1993). The GUI Interface and the use of the mouse also gave graphic designers the freedom to work directly on the computer in an environment created by contemporary software programs instead of drawing the image by hand and then transferring it to the computer with the aid of a scanner. These types of programs allow the mouse to be used not only as a point and click device, but as a device that acts much like a pencil. The designer can draw, measure, move, and manipulate elements within a particular design without having to take the extra time to do these things by hand. For years, people thought that the computer would make the need for a graphic designer obsolete and that computers would allow anyone to create their own designs. Graser (1999) agreed that through the availability of cheaper computer hardware and software components, more individuals were able to strike out on their own and become separate from the larger corporations who hire hundreds of tech-savvy employees. Cheaper hardware and software does not guarantee that the individual will become more creative or learn valuable techniques that can only come from formal training. It also does not teach the individual how to give the project flare in order to catch the eye of the consumer.

Lack of skill and training created a new problem. Individuals recognized that they needed more training in order to allow themselves to compete with the professional graphic designers without having to commit extensive time or money toward it. In time, small businesses began to provide low-cost, quickie computer courses everywhere, so that anyone so inclined may attend these courses and give themselves the right to call him or herself a designer. These individuals who lack formal training, professional expertise, and experience, lowered the standard for excellence by pricing themselves lower than their truly talented, professional, educated, and experienced counterparts (Steiner, 1998).

Computer Platforms

Computers are differentiated between the IBM compatible platform (PC) which are made by many companies that would include IBM, Hewlett Packard, Gateway, Dell, and Epsom and the Apple Macintosh platform (MAC) Burger (1993) explained that:

> If the microprocessor and memory form the computer's physical brain, the operating system, or OS, is the mind that inhabits and utilizes it. The OS acts as an overall system manager providing some or all of the following functions:
>
> 1. Manages the access programs have to the various hardware components of the system, such as the processors, memory, system bus, mass storage devices, and external interfaces.
> 2. Loads programs into memory and runs them.
> 3. Keeps track of system memory and how it is being used by various software and system resources to prevent memory conflicts.
> 4. Manages the organization of disks and the storage and retrieval of files.
> 5. Provides a toolbox of standard routines that programs can use to perform common functions.
> 6. Provides a way for various programs to share data.
> 7. Manages how various programs share the microprocessor in a multitasking system.
> 8. Handles memory paging in multitasking and virtual memory systems.
>
> Common operating systems are MS-DOS and OS/2 on PC - compatibles and the IBM PS-Series, the System on the Macintosh, AmigaDOS on the Amiga, and UNIX across a variety of platforms. (DOS is an acronym for disk operating system and is used fairly interchangeable with OS) (p. 94-5).

Hardware

The term hardware refers to actual computer components that the graphic designer needs to be familiar with in order to perform their job efficiently. These components would include a monitor, a keyboard, a mouse, a printer, a scanner, and a hard drive on which to store the information. The following information contains short descriptions of each of the components used in a computer system.

In order to view what the computer is processing and to view the commands that are given to the computer to perform, the computer operating system is hooked up to a monitor. Although monitors are made by many different companies and are offered in different sizes and colors for the user to choose from, their functionality universally remains the same. The computer monitor consists of two components: the CRT and the display circuitry that drives it. The CRT (cathode-ray tube) is the picture tube that is used in televisions, oscilloscopes, radar, video monitors, and computer monitors. This tube consists of a screen coated with phosphorescent dots called pixels (short for picture elements). The phosphors glow when they are bombarded with electrons from an electron gun at the back of the tube. The pattern and intensity of the bombardment determines the nature of the image we discern on the screen and will linger for a short time after bombardment has stopped due to a phenomenon known as persistence. The process repeats itself continually to refresh the screen as the phosphors fade from each pass of electrons. Most computer monitors draw every line in sequence from the top of the screen to the bottom at a rate of approximately sixty times per second (Burger, 1993).

The keyboard and mouse are both external devices that allow the graphic designer to give the computer commands for writing text and for selecting and drawing objects. The keyboard is exactly like a typewriter's keyboard with additional keys that allow other commands. The mouse is a small device connected to the computer that allows the user to select objects shown on the screen by clicking a button on the mouse. When the mouse is rolled on the desk, an image of an arrow on the screen simultaneously moves in the same direction as the mouse. When the image of the arrow is over an object the user wants to select, with a click of a button on the mouse, the user has selected that object. This is referred to the point-and-click operation. If you want to move an object, you can click on the object and without releasing the button, you can drag the image to a new position. This is referred to as the click-and-drag operation.

Once the computer operator has created an image or a written text file, they may choose to print it for others to see it. The basic principle of the printer is that the information contained in a file is sent to the printer which then stores that information in a memory bank. With this step completed, the printer can print on paper a preselected amount of copies. The printer also has the capability to store many documents in the memory bank and can print them in the order in which they were received. All printers can easily be used with either platform (PC or MAC) because they come with an installation disk that allows operational information concerning the printer to be stored on the computer's hard drive.

If an image has been created by other means besides the computer, i.e. hand drawn or photographed, there is a way to transfer this image to the computer without having to redraw it. Scanners or digitizers provide a means for any existing image to be digitized into the computer. There are three choices of scanners. The first choice is the inexpensive, hand-held models which are spatially restrictive. The second choice is flatbed scanners which offer a choice between letter and legal sized scanning beds corresponding to paper of the same size. Finally, are drum scanners that are used to digitize extremely high-resolution images for print production. The flatbed scanner is the most popular model selected for use with the desktop computer PC. They resemble small photocopy machines where the image to be scanned is placed face-down on a clear glass surface and scanned from underneath. A moving head containing a light source and mirror is moved along a track beneath the image. The light illuminates each line of the scanned image and the mirror reflects the image through a lens into a charge-coupled device or CCD. The charge-coupled device converts the incoming light into voltages whose amplitude corresponds to the intensity of the light. Analog-to-digital converters transform these voltages into digital information. This process is repeated line-for-line until a complete digital representation of the image is available for storage and manipulation as a standard bitmap file (Burger, 1993).

Most hardware equipment for the computer is externally connected to the computer's hard drive. These peripheral devices are either created by the same company that creates the computer system or by companies that have made the peripherals compatible with the PC or MAC platforms. Each component is packaged with a compact disk (CD) or a floppy disk that will allow the computer's operator to install information onto the computer's hard drive to allow the two devices to integrate. The keyboard, mouse, and monitor are usually part of the package that comes along with the computer system. Printers, copiers, scanners, and digital cameras are all additional hardware components that can be connected to the computer. These devices also come with a CD or floppy disk with installation information.

Software

All computer hardware systems can store different types of software programs and data within its hard drive. These programs provide the user environments for working with graphics, documents, or the capability to link to the World Wide Web. As each system has evolved, the software programs are simultaneously changing to suit the particular needs of the operational system for which it was designed. Most software can be used on both platforms, but the capability of sharing files between the platforms is still not a possibility. This mixture of platforms and software creates a confusing problem for the user to differentiate in selecting the best for a successful career in the graphic design profession.

The following computer software descriptions are for the programs that have been popular in the graphic design environment and those programs that were selected for survey items. These descriptions came from overviews that were written by the companies who created them.

Adobe Photoshop

> For the last few years, Web designer and producers have relied on Adobe Photoshop software as a creative tool for designing superior Web graphics. Now Adobe Photoshop 5.5 software is expanding that role, adding comprehensive optimization

features for producing the highest quality Web graphics with the smallest possible file sizes. It also provides the Adobe ImageReady 2.0 component for advanced Web-production tasks, such as creating sliced images, sophisticated Java Script rollovers, dynamic animations, and image maps. In addition, Photoshop 5.5 is fulfilling customer requests for several creative features, including powerful new masking tools for easily masking images with hard-to-define edges. With this new functionality, Photoshop 5.5 delivers a complete, integrated image-editing solution for print and the Web. Whether you're a creative professional who's passionate about print, a Web designer or producer who's devoted to the Web, or someone designing for both, Photoshop 5.5 provides the toolset you need to create the finest digital images (Adobe System Incorporate, 1999, Photoshop, p.1).

Microsoft PowerPoint 2000

Microsoft PowerPoint 2000 makes it easy to organize, illustrate, and deliver your ideas professionally. Whether you're conducting a meeting, presenting to an audience, or delivering your message over the Internet, these are the tools you need to make your point - powerfully.

Benefits:

1. Broadcast your presentation to the Web
2. Create powerful presentations quickly
3. Make learning easier
4. Draw and reformat tables (Microsoft Corporation, 2000, PowerPoint, p. 1).

QuarkXPress

The layout and design choice of the world's top publishers, QuarkXPress is available in 11 languages. QuarkXPress is more than just a page layout software. An integrated publishing package. QuarkXPress lets you combine pictures, text, typography, writing, editing, and printing – in one application. What's more, this program gives you total command over page layout (Quark System Incorporate, 2000, p.1).

Adobe PageMaker 6.5 Plus

Adobe PageMaker 6.5 Plus is the award-winning page layout program for all your business publishing needs...not only does Adobe PageMaker 6.5 Plus include hundred of templates for you to use as starting points, but the program also allows you to work at your own design level with beginner, intermediate, and advanced template versions...No matter how you begin, the PageMaker 6.5 Plus interface boasts familiar toolbars and the same menus, palettes, and keyboard shortcuts found in other Adobe applications, making document production a snap...Adobe PageMaker 6.5 Plus allows you to apply sophisticated layout features and typography styles for professional design effect. It also provides access to thousands of stock illustrations and photographs to help you enhance your work along the way. And, with

PageMaker 6.5 Plus, you can create a wide variety of documents, from simple, one-page flyers to complex reports of up to 999 pages (Adobe System Incorporate, 1999, p.1).

Dream Weaver

Dream-weaver.com is the complete web design solution for you. Your image on the World Wide Web will increase in priority as we enter the new millennium and internet use and e-commerce booms. Your Web site is the most cost effective way of reaching the global market. No matter how big your business, not matter how small your club or community. You will benefit from a global presence (Dream-Weaver System Incorporate, 2000, p.1).

Microsoft FrontPage 2000

The Microsoft FrontPage 2000 Web site creation and management tool gives users everything they need to easily create and manage great Web sites. FrontPage 2000 allows users to easily create great-looking Web sites exactly the way they want. They can give their Web site a professional and consistent look across all pages, import and edit HTML just as they like, and use the latest in Web technology. FrontPage 2000 allows users to easily update sites and quickly and flexibly manage Internet or intranet Web sites. Users can set up and maintain their site, easily monitor the condition of their Web site, and make updates. Workgroups or teams can work together on sites, and companies can install and administer FrontPage 2000 across their company. FrontPage 2000 allows users to work together with Microsoft Office to save time. FrontPage 2000 was designed to function more like Microsoft Office so that users can get up and running with FrontPage more quickly than ever (Microsoft Corporation, 2000, p.1).

Corel WordPerfect

For those seeking alternative office applications to cut costs, your search should start with Corel...You don't want to switch to a competitor unless your present Office documents can be painlessly converted to the new application. WordPerfect 9 is compatible with Word 97, and it easily opened previous files stored in that format. Quattro Pro 9--a venerable spreadsheet application--easily opened existing Excel 97 spreadsheets, as well as Office 98 files from Macintosh...You don't want to have to train users on a new application, thus eating up upgrade savings. Like WordPerfect, Quattro Pro provides an Office-like interface that makes using it effortless for Microsoft users...At the same time, it adds its own unique enhancements. Similarly, Corel Presentations 9 is a multimedia and drawing application that lets former PowerPoint users painlessly produce slide shows and multimedia presentations...You also want to make sure you don't give up any of Office's benefits while switching to a competitor. I found that WordPerfect Office ran stride for stride with Microsoft Office in several key areas, including its Internet awareness. WordPerfect 9 can automatically convert text to a hyperlink, or publish documents in HTML, Trellix, or PDF formats. Quattro Pro 9 includes Web-oriented functions such as its Publish

to HTML Expert function, which lets users create HTML pages that communicate and share data through an intranet site or the World Wide Web. Presentations 9's Internet Publisher function lets users turn presentations into Web pages, and includes step-by-step instructions on how to publish a slide show to the Web (Farace, 2000, p.1).

CorelDRAW 9

CorelDRAW, evolved from a loose collection of graphics utilities with broad appeal to one drawing and one paint application targeted at skilled illustrators...As graphic applications add more features, multiple palettes can dominate the main workspace. CorelDRAW now docks all windows, such as filters and colors, on the edge of the screen to keep them out of the way – yet these functions are always accessible by merely clicking on a tab. Numerous improved tools helped the user draw faster and more precisely...In output, CorelDRAW 9 ships with several new color palettes, including Pantone Hexachrome, as well as metallic and pastel colors. The new Publish to PDF feature – which is like having a built-in copy of Adobe Acrobat Distiller – generated PDF files that were identical to the originals...To post pages on the Web, CorelDRAW's HTML conversion function closely matched the original design. Graphics were changed to the appropriate screen resolution and text styles translated to Cascading Style Sheets (CSS)...This powerful vector-illustration and page-layout application includes Photo-Paint 9, which is ideal for retouching photos, adding effects, creating Web graphics, and originating bitmaps (Heck, 1999, p.1-2).

Adobe InDesign

Adobe Photoshop, Adobe Illustrator, and Adobe InDesign share common commands, tools, palettes, and keyboard shortcuts, so you can apply what you know about one program to another. New drawing and transformation tools in InDesign 1.5 enhance this integration. Shared Adobe technologies provide consistent handling of colors, type, and graphics...Paste a frame within a frame and then easily rotate or adjust its position. Edit text even after applying a gradient, or quickly draw graphics for your layouts. New features make it easy to align text to any path and then apply special effects; wrap text around any imported EPS, Adobe Portable Document Format (PDF), or image file; create clipping paths from alpha channels; and more (Adobe System Incorporate, 2000, p.1).

Adobe Illustrator 9.0

Adobe Illustrator 9.0 software puts the power of editable vector graphics to work for the Web. Plus it expands your creative range and enhances your productivity with unlimited transparency capabilities, powerful object and layer effects, and other innovative features. And it tight integration with other Adobe software ensures a smooth, efficient workflow. Use the fast, flexible tools in Illustrator 9.0 to transform your creative ideas into sophisticated Web graphics, logo designs, type treatments, illustrations, packaging, presentations, technical drawings, and information graphics. Then showcase your graphic in print, on the Web, or in dynamic media with complete creative freedom (Adobe System Incorporate, 2000, p.1).

Hiring A Graphic Designer Checklist

Finally, what do employers do when they want to hire a graphic designer but are unfamiliar with the industry? Steiner (1998) supplied a checklist that might help an employer with their decision:

1. Determine the candidate's professional experience. It should include both computers and hands-on design.
2. Has the candidate had any formal schooling in graphic design, editorial design, typography, color theory, art history, Mac computer and graphics software programs? If the candidate's knowledge is limited to a short course of study in computer use and computer software programs, you will do better to keep looking.
3. Has the candidate studied and professionally utilized the following software programs: QuarkXPress, PageMaker, Photoshop, Illustrator, Freehand, Microsoft Word or WordPerfect?
4. Does the candidate understand basic computer terminology?
5. Is the candidate knowledgeable about and have expertise in imaging, prepress, paper, scanning and printing?
6. Does the applicant have a design portfolio of professional work? If yes, it's important to ask what part of any sample he or she was responsible for. Ask about the concept/idea, the choice of typefaces and the selection or commissioning of images. You wan to make sure that the applicant didn't simply execute his or her art director's layout.
7. Is the applicant willing to take a little test covering both design and knowledge of the computer and software? (p. 62-63).

Because of Steiner's decision to include software requirements that were important in 1998, this list needs to be updated periodically to provide accurate information concerning software that is currently used or is anticipated for future use in graphic design. The reason for this is that computer technology rapidly changes in response to the need for improved productivity and for correcting errors within current hardware and software programs.

CHAPTER III

METHODOLOGY

Research for this independent study was designed around the basic need for clearer communication between universities and businesses concerning required academic preparation in the graphic design industry. Because of the rapid changes in computer technology, the universities have difficulty in keeping pace with the demands of the industry. In order to achieve clarity of these demands, it was decided to survey the businesses and universities separately to maintain individuality. Businesses were questioned on the expectations for employees and universities were questioned on the type of program of study provided to meet business' needs. A sample of the graphic design industry and universities were surveyed. Therefore, the research population involved the businesses and universities in the Grand Forks region.

An address list was compiled for the two subject groups. Subjects were identified by using an area phone directory for selection of businesses in Grand Forks that had anything related to the graphics industry within their name or business description and by using the Internet for selection of universities in the surrounding region.

Information to be included as survey items were researched, analyzed, and evaluated for inclusion. Questions were developed and two surveys were written. One directing questions toward businesses (Appendix A) and another directing questions toward the universities (Appendix B). The questions in both of these surveys were geared toward the goal of obtaining information concerning: the hardware and software presently being used and anticipated future needs; how individuals would

rate certain software programs according to importance to the industry; and how individuals keep informed about the rapid changes in the industry. The surveys also allowed open-ended response items for the businesses and universities to include hardware or software programs that they believed were more important than the ones identified by the survey. Another goal of the surveys was to build a bridge of communication between the businesses and the universities so that future graphic designers can be educated to meet the demands of businesses in the region. Open-ended questions were included for receiving responses and recommendations from the businesses and the universities on how to better establish communication links.

Each survey was prefaced with a letter of introduction (Appendix C) identifying the researcher, the purpose of the survey, and ensuring the confidentiality of those participating. This letter accompanied the surveys along with an addressed, stamped envelope. The surveys were to be returned to the researcher for analysis.

The two surveys and the letter of introduction were submitted to the Institutional Review Board for approval. Corrections suggested by the Institutional Review Board were made to the surveys and final approval was secured. The initial mailing was prepared and sent to the sample of businesses and the universities identified. After the initial three weeks, a follow-up letter was sent to those not responding (Appendix D).

Upon receipt, responses were compiled in a database software program called Quattro Pro. This is a data program that allows material to be compiled in a spreadsheet chart form. All business and school names were omitted from the spreadsheets in order to ensure their confidentiality. Each question was divided into separate coded sections for ease of data compilation and analysis. The completed charts (Appendices E & F) and a list of comments and recommendations (Appendix G) were compiled and analyzed. Summarys, conclusions, and recommendations were developed based on evaluation of the collected data.

A letter of appreciation (Appendix H) to all subjects within both groups surveyed for this study. Copies of the results of this study were also sent with this letter of appreciation to the businesses and universities who requested the results by indicating this request within the open-ended question that asked for their concerns or recommendations for this study.

CHAPTER IV

PRESENTATION

In this section of the study, the survey results were presented. Each question was addressed and the results were summarized. A total of 94 surveys were mailed out, 12 of them were sent to regional universities and 82 to businesses in the Grand Forks, North Dakota region. Out of those 91 surveys, 32 were returned by the respondents from businesses and five were returned by respondents from the universities.

Business Survey Results

To establish a basic understanding of what equipment is more widely used, the 82 businesses were questioned about the type of computer platform presently being used for graphic design needs. As presented in Table B.1, 16 business respondents indicated that they used only PC platforms, nine indicated that they used only Apple Macintosh platforms, five indicated that they used both the PC and Apple Macintosh platforms, and two indicated that they used none of their computers for graphic design. From the responses given by these 32 respondents, it was calculated that at least 46 PC platform computers and 26 Macintosh platform computers are used for graphic design.

Table B.1 Types Of Computer Platforms Used By Businesses

Type of Computer Platform	Number of computers Indicated	Number of Businesses	% of Total Businesses
PC Only	27	16	50.00%

Table B.1 (Continued)

Apple Macintosh Only	18	9	28.00%
Both	19 PC and 8 Mac	5	15.65%
Other	0	2	6.35%

To further learn about these businesses, questions two through five were directed toward the business' personal need to hire a graphic designer as a full time employee, part-time employee, or a one-time employment opportunity through another company. The first of these questions asked the businesses respondents if they employed a graphic designer. In Table B.2, 13 business respondents indicated that they employ full-time graphic designers, five indicated that they employ part-time graphic designers, one indicated that they employ both a full-time and a part-time graphic designer, and 13 business indicated that they do not employ any.

Table B.2 Employment History Of Graphic Designers

Type of Employee	**Number of Employees Hired**	**Number of Businesses**	**% of Total Businesses**
Full Time	14	13	40.625%
Part Time	5	5	15.625%
Both Full Time and Part Time	1 Full Time and 1 Part Time	1	3.125%
None	0	13	40.625%

When these businesses were asked how often they require the assistance of a graphic designer in one month, only two respondents indicated that they seek assistance of a graphic designer, (Table

B.3). One respondent indicated that they go outside of their business 10 to 15 times a year seeking the assistance of a graphic designer, while another respondent indicated three to four times a year.

Table B.3 Number Of Times That Outside Help Is Required From Graphic Designers

Number of Times Companies seek the assistance of Graphic Designers within a month	Number of Businesses	% of Total Businesses
10-15 times a year	1	3.125%
3-4 times a year	1	3.125%

Since graphic designers are numerous, the businesses were asked where they would go to find qualified graphic designers to help them with their graphic needs. In Table B.4, it was reported that six business respondents indicated that they chose to go to a local advertisement firm, three chose a local printing firm, and five chose different sources that would include the Grand Forks Herald, the University of North Dakota, and their own staff. No response was received from the remainder.

Table B.4 Type Of Business Settings Where Graphic Designers Were Sought

Type of Business Setting	Number of Businesses	% of Total Businesses
Local Advertising Firm	6	18.75%
Local Printing Firm	3	9.375%
Other:		
Grand Forks Herald	1	3.125%
University of North Dakota	1	3.125%
Own Staff	1	3.125%
No Answer	20	62.50%

The last question querying about hiring personnel was to determine if the businesses anticipated hiring a graphic designer for a full-time or part-time position and to ask about the time frame anticipated. If they were not planning to hire a graphic designer, they were asked why. In Table B.5, none of the business respondents indicated that a full-time employee would be hired, one indicated that a part-time employee would be hired in the next two months. No hires were anticipated by 16 of the business respondents explaining that there was enough experience on staff to cover this need. No answers was given by 15 respondents without an explanation.

Table B.5 Anticipated Employment Of Graphic Designers

Type of Employee	Number to be Hired	Number of Businesses	% of Total Businesses
Full Time	0	0	0%
Part Time	1	1	3.125%
No with no explanation	0	9	28.125%
No, because of staff experience	0	7	21.875%
Left Blank	0	15	46.875%

The focus of the survey transitioned from employment options presently pursued to inquiring about the types of computer hardware used in each business and their anticipated future use. In Table B.6, 21 business respondents indicated that they used IBM compatible platform computers with two of them seeking to upgrade to a faster computer. Apple Macintosh platform computers were utilized by 13 respondents with three of them seeking to upgrade to a faster computer. Scanners were being used by 26 business respondents, while one business respondent was looking to purchase one. Color copiers were used by six business respondents and none were anticipating that they would be buying one in the future. Twenty-six business respondents indicated that they used a color printer and two

respondents were planning to buy one. Digital cameras were used by 10 business respondents, while two were planning to buy one. Other forms of hardware components were used by 13 business respondents, while one business respondent was planning to purchase a CD burner.

Table B.6 Current And Anticipated Use of Computer Hardware In Businesses

Equipment	Presently Use	% of Total Businesses	Anticipated Use	% of Total Businesses
IBM Compatible Platform: Computer hardware representative of the IBM compatible Platform ranging from 386 technology to Pentium III technology.	21	65.625%	2	6.25%
Apple Macintosh Platform: Computer hardware representative of the Apple Macintosh platform ranging from Power Mac technology to IMAC technology.	13	40.625%	3	9.375%
Scanners: Computer hardware that includes Hewlett Packard, Microtek, and Dell. All can be programed to work with either computer platform.	26	81.25%	1	3.125%
Color Copier: Computer hardware that includes Hewlett Packard, Xerox, and Canon. All can be programed to work with either computer platform.	6	18.75%	0	0%
Color Printer: Computer hardware that includes Hewlett Packard, DeskJet, Canon, and Epsom. All can be programed to work with either computer platform.	26	81.25%	2	6.25%

Table B.6 (Continued)

Digital Cameras: Computer hardware that includes Sony and Nikon which are programed to work with either computer platform.	10	31.25%	2	6.25%
Other: This category would include black and white scanners, printers, and copiers.	13	40.625%	1	3.125%

Business respondents were queried about what other qualities or skills they considered important when hiring a person for a graphic design position. In Table B.7, 18 business respondents considered previous experience with other platforms important, 17 chose Windows 95 or higher, two chose OS/2, two chose Linux, and three indicated they preferred someone with skills with MAC, DOS, or any of the previous choices. Beyond the operating systems for these platforms, other skills were considered important. Seven business respondents chose photographic skills, 12 chose Web page design skills, 16 chose color separation skills, and five chose other skills that would include skills in QuarkXPress, Adobe Photoshop, Adobe Illustrator, original thought and software skills, and good computer and design skills. One business respondent indicated that they have never hired a graphic designer.

Table B.7 Types Of Skills Reported Important By Businesses For Hiring Graphic Designers

Type of Skill	Number of Businesses	% of Total Businesses
Previous Experience with other platforms	18	56.25%
Windows 95 or Higher	17	53.125%

Table B.7 (Continued)

OS/2	2	6.25%
Linux	2	6.25%
Other: Mac, DOS, Any	3	9.375%
Photography	7	21.875%
Web Page Design	12	37.50%
Color Separation and Printing Processes used by printers.	16	50.00%
Other	5	15.625%

Reported in Table B.8, was how business respondents kept current on computer hardware or software used in the graphic design industry. Magazines/journals were chosen by 20 respondents, Internet information was chosen by 14, interaction with other companies was chosen by 10, mailing literature was chosen by nine, education classes were chosen by six, sales people were chosen by four, user groups were chosen by three, and nine chose "other". These would include designers in different markets, corporate rollout, using the products, help from a brother, help from kids, word-of-mouth, and software updates. One business respondent indicated that they do not keep current.

Table B.8 Resources Used By Businesses To Research New Hardware And Software Packages

Types of Resource	Number of Businesses	% of Total Businesses
Magazines/Journals	18	56.25%
Internet Information	17	53.125%
Interaction with other companies	2	6.25%
Mailing Literature	2	6.25%
Education Classes or Seminars	3	9.375%

Table B.8 (Continued)

Sales People	7	21.875%
User Groups	12	37.50%
Other	16	50.00%

The next question ascertained how business respondents rated PC and MAC platform computers and 10 software programs according to their current use and importance in the graphic design industry. Each box contains a number that represents the number of business respondents using that particular item. The last column represents no answer provided. In Table B.9, 17 business respondents indicated that they believed that PC platform computers were either important or very important in graphic design compared to 12 who believed the same about Apple Macintosh platform computers. The following software programs were viewed as important or very important tools currently used in the graphic design industry: Two business respondents chose Dream Weaver, two chose Microsoft FrontPage, four chose Corel WordPerfect, six chose PowerPoint, seven chose Adobe InDesign, 10 chose Adobe PageMaker, 12 chose CorelDRAW, 14 chose Adobe Illustrator, 15 chose QuarkXPress, and 23 chose Photoshop. Several business respondents indicated that they did not know about some of the programs and 11 of the business respondents added other software programs to those they thought were very important to the graphic design industry. This selection would included: Freehand, Dream Maker, Claris Works, Flexsign Pro, Painter 5.0, Fireworks, Mac Link Plus, Adobe Premier, Bryce 4, Powertools, and Vector Plotting Program.

Table B.9 (Continued)

Bryce 4						1	
Powertools						1	
Vector Plotting Program						1	

Likewise, the next question ascertained how business respondents rated PC and MAC platform computers and 10 software programs according to their anticipated use and importance in the graphic design industry. Again, each box contains a number that represents the number of business respondents using that particular item. The last column is representative of no answer provided. In Table B.10, it is reported how these 32 business respondents rated these items. Fourteen respondents indicated that they believed that PC platform computers were either important or very important in the future of graphic design compared to 13 who believed the same about Apple Macintosh platform computers. The following software programs were viewed as important or very important tools that are anticipated being used in the graphic design industry: Two business respondents chose Dream Weaver, three chose Microsoft FrontPage, three chose Corel WordPerfect, six chose CorelDRAW, six chose Adobe InDesign, eight chose PowerPoint, 10 chose Adobe PageMaker, 12 chose Adobe Illustrator, 15 chose QuarkXPress, and 20 chose Photoshop. Several business respondents indicated that they did not know about some of the programs and eight added other software programs to those they thought were anticipated important to graphic design. This selection would include: Freehand, Fireworks, Web Design, Cad Link, Adobe Premier, Symbol Graphics, and Aires Graphics.

Table B.10 Business Ratings On **Anticipated** Use Of Software Programs According To Importance

	Don't Know	Not Important	Little Importance	Somewhat Important	Important	Very Important	No Answer
PC Platform	4	4	1	1	3	11	8
Apple Macintosh Platform	8	1	0	1	4	9	9
Photoshop	8	0	0	0	5	15	4
PowerPoint	12	2	2	2	2	6	6
QuarkXPress	10	1	0	2	7	8	4
Adobe PageMaker	7	4	3	3	6	4	4
Dream Weaver	16	2	3	3	0	2	6
Microsoft FrontPage	12	3	2	5	2	1	7
Corel WordPerfect	10	6	2	6	3	0	5
CorelDRAW	10	4	1	5	3	3	6
Adobe InDesign	12	2	2	4	2	4	6
Adobe Illustrator	9	2	0	3	5	7	6
Others:							
Freehand					1	2	
Fireworks						1	
Web Design						1	
Cad Link						1	
Adobe Premier						1	
Symbol Graphics						1	
Aires Graphics						1	

When the business respondents were asked if they had any recommendations for this study, 12 gave brief comments or recommendations. These ranged from appreciation for this kind of study and requests that the results be sent to their businesses to recommendations that an emphasis of this study needed to focus on what designers can accomplish without the use of a computer. One respondent stated, "The biggest problem in hiring designers in the GF market is lack of talent. Computer skills are great & necessary, but without talent they are really useless in graphic design. I'd like to see designers who can design first without the computer - then translate those design skills into the digital platform. Technology can't replace a good eye." Another respondent stated, "I think graduating senior should have much more hands on experience in work studies, etc. Once you look for a job you need more experience than what the classes give you." And the final respondent stated, "The PC is a terrible platform for graphic design. Adobe InDesign (Quark Killer) is the future for print house use of graphics software. When hiring, CMYK color conversion and previous 4 color process artwork are looked for." Because a majority of the responses given did not pertain to the context of this study, the full responses are presented in Appendix G.

University Survey Results

Of 12 universities surveyed, five university respondents returned their surveys, one of which only answered a few questions in the survey.

To establish a basis for communication with the universities, the researcher asked if a program of study was provided for students who are interested in a career in graphic design. In Table U.1, it was reported that two university respondents offered programs and three did not. Two that did not offer programs responded that it was because there was not enough resources in the budget for new computer hardware and software necessary for a graphic design curriculum and the third responded that there was no one available to teach the required course work.

Table U.1 Number Of Responses To Programs Offered In University Curriculum

Does your University offer a Graphic Design program of Study?	Number of Universities	% of Total Universities
Yes	2	40.00%
No	3	60.00%

University respondents were then asked what school or department would a graphic design program of study be classified under. The respondents indicated that the graphics program would be housed in either visual arts or related departments including: applied arts, related fields concentration, and information networking management (Table U.2).

Table U.2 University Departments Responsible For Graphic Design Programs Of Study

Department	Number of Schools	% of Total Schools
Advertising	0	0.00%
Communications	1	20.00%
Computer Science	0	0.00%
Marketing	0	0.00%
Industrial Technology	0	0.00%
Visual Arts	1	20.00%
Other	3	60.00%

To understand more about university curriculum, the university respondents were asked what types of computer hardware was used to instruct courses in graphic design. IBM compatible platform PC computers were used by one university and three universities used Apple Macintosh platform computers. Scanners were used by three universities, no one used color copiers, color printers were

used by three, digital cameras were used by three, and one used other equipment in their computer labs (Table U.3). One university respondent chose not to answer this question.

When asked what the universities anticipated for future use in the classroom for instruction, it was reported in Table U.3 that one university respondent planned to upgrade their IBM compatible PC computer platform, one planned to upgrade their Apple Macintosh computer, none planned to upgrade their scanners, none planned on purchasing a color copier, two planned on upgrading their color printers, one planned to purchase a digital camera, and one planned on upgrading their other equipment. One university respondent chose not to answer this question.

Table U.3 Current And Anticipated Use Of Computer Hardware In Universities

Equipment	Presently Use	% of Total Universities	Anticipated Use	% of Total Universities
IBM Compatible Platform: Computer hardware representative of the IBM compatible Platform ranging from 386 technology to Pentium III technology.	1	20.00%	1	20.00%
Apple Macintosh Platform: Computer hardware representative of the Apple Macintosh platform ranging from Power Mac technology to IMAC technology.	3	60.00%	1	20.00%
Scanners: Computer hardware that includes Hewlett Packard, Microtek, and Dell. All can be programed to work with either computer platform.	3	60.00%	0	0.00%
Color Copier: Computer hardware that includes Hewlett Packard, Xerox, and Canon. All can be programed to work with either computer platform.	0	0.00%	0	0.00%

Table U.4 (Continued)

Faculty Recommendations	1	20.00%
Surveys	0	0.00%
Student Interest	2	40.00%
Other	1	20.00%

When the universities were asked how often the computer system's hardware and software was updated, four different responses were provided by respondents. These included: every two years; every year; every two to four years as money permits; and frequently. One university respondent chose not to answer this question.

The next question asked how the universities rated PC and MAC platform computers and 10 software programs according to their current use and importance in the graphic design industry. Each box contains a number that represents the number of university respondents using that particular item. The last column represents no answer provided. In Table U.5, it was reported that one university respondent indicated that they believed that PC platform computers were either important or very important in graphic design compared to two who believed the same about Apple Macintosh platform computers. The following software programs were viewed as important or very important tools currently used in the graphic design industry: One university respondent chose Adobe InDesign, one chose Power Point, two chose Adobe Illustrator, three chose QuarkXPress, three chose Adobe PageMaker, four chose Photoshop, and four chose Dream Weaver. A few respondents were not familiar with some of the programs. Four added other software programs which included: Freehand, Fireworks, and Director. One university respondent chose not to answer this question.

Table U.5 University Ratings On **Current** Use Of Software Programs According To Importance

	Don't Know	Not Important	Little Importance	Somewhat Important	Important	Very Important	No Answer
PC Platform	0	1	0	1	0	1	2
Apple Macintosh Platform	1	0	0	0	0	2	2
Photoshop	0	0	0	0	0	4	1
PowerPoint	0	0	2	1	0	1	1
QuarkXPress	1	0	0	0	1	2	1
Adobe PageMaker	0	0	1	0	2	1	1
Dream Weaver	0	0	0	0	2	2	1
Microsoft FrontPage	0	1	3	0	0	0	1
Corel WordPerfect	0	2	2	0	0	0	1
CorelDRAW	0	1	1	2	0	0	1
Adobe InDesign	2	0	1	0	0	1	1
Adobe Illustrator	0	0	0	2	0	2	1
Others:							
Freehand					2		
Fireworks					1		
Director					1		

Likewise, the next question ascertained how universities rated PC and MAC platform computers and 10 software programs according to their anticipated use and importance in the graphic design industry. Again, each box contains a number that represents the number of university respondents using that particular item. The last column represents no answer provided. In Table U.6,

it is reported how these five universities responded to each of these items. Two university respondents indicated that they believed that PC platform computers were either important or very important in the future of graphic design compared to two who believed the same about Apple Macintosh platform computers. The following 10 software programs were viewed as important or very important tools anticipated for use in the graphic design industry: Two university respondents chose PowerPoint, two chose Adobe PageMaker, two chose Adobe InDesign, three chose QuarkXPress, four chose Photoshop, four chose Dream Weaver, and four chose Adobe Illustrator. A few university respondents indicated that they were not familiar with some of the programs. Four added other software programs including: Freehand, Fireworks, Director and Aires Graphics. One university respondent chose not to answer this question.

Table U.6 University Ratings On **Anticipated** Use Of Software Programs According To Importance

	Don't Know	Not Important	Little Importance	Somewhat Important	Important	Very Important	No Answer
PC Platform	0	1	0	0	1	1	2
Apple Macintosh Platform	1	0	0	0	0	2	2
Photoshop	0	0	0	0	0	4	1
PowerPoint	0	1	1	0	1	1	2
QuarkXPress	1	0	0	0	1	2	1
Adobe PageMaker	0	1	1	0	1	1	1
Dream Weaver	0	0	0	0	1	3	1
Microsoft FrontPage	0	3	0	1	0	0	1
Corel WordPerfect	0	3	1	0	0	0	1

Table U.6 (Continued)

CorelDRAW	0	1	2	1	0	0	1
Adobe InDesign	?	0	1	0	1	1	1
Adobe Illustrator	0	0	0	0	1	3	1
Please list others:							
Freehand				1	1		
Fireworks						1	
Director						1	
Aires Graphics							

When the universities were asked about any present or future concerns they have in regard to their academic program in graphic design only two provided comments. One university respondent requested information on what design applications are most used in industry and the other was that, "Expansion for print design to now include the Web, multimedia. More interactive graphics."

Finally, the universities were asked if they had any recommendations concerning this study, the only respondent believed that,"Yes, all emphasis is on hardware and software. They are only tools and do not address the important issues of becoming a graphic designer. One problem in the graphic design profession is the misconception that a computer is the key to becoming a designer." Because the comments and recommendations that were given by the other respondents did not pertain to the context of this study, the full responses are presented in Appendix G.

Comparison Of Hardware And Software

To make necessary recommendations at the conclusion of this study, it is important to look at the results not only at their stated face value, but to analyze the results in the following manner. By choosing certain questions regarding hardware and software, the survey results were divided among three categories: businesses or universities using only PC computers, businesses or universities using only MAC computers, and businesses or universities using both types of computers.

Businesses

In Table C.1 it was reported how the 32 business respondents were categorized by the type of computer platform they used. Sixteen business respondents used PC computers, nine used MAC computers, and five used both types of computers. It was also reported that one of the 16 business respondents that used PC computers and one of the five business respondents that used both types of computers are looking to upgrade to a Pentium III PC.

When business respondents were questioned concerning what skills were considered when hiring a graphic designer, 11 using PCs, three using MACs, and three using both types of computers indicated that previous platform skills were important. Further questioning about specific operational systems reported that 10 business respondents using PCs, two using MACs, and four using both types of computers favored Windows. At the same time, one business respondent using a MAC and one using both types of computers favored OS/2 and only two using MACs favored Linux. When given the opportunity to add other choices, one business respondent using a MAC looked for skills on any of the previous choices and two using both computer systems indicated that knowledge on DOS or a MAC were helpful.

The business respondents were also questioned about skills that do not fall within the realm of computer system skills. These skills included photography, Web page development, and color separation and printing processes. Three business respondents using PCs and four using MACs chose

photography skills. Six business respondents using PCs, four using MACs, and two using both computer systems chose Web page development. Five business respondents using PCs, eight using MACs, and five using both computer systems chose color separation and printing processes. In addition to these choices, one business respondent using a PC indicated that knowledge with QuarkXPress and Photoshop were helpful, while two using MACs also responded with one indicating that knowledge with QuarkXPress, Photoshop, FreeHand, and Adobe Illustrator software programs was helpful, while the other indicated that graphic designers that showed talent with original thought and software skills are helpful.

The business respondents were then asked to rate how important the two computer systems and the ten software programs were rated according to their current use in the graphic design industry. It is reported by question nine of Table C.1 that nine respondents using PCs, four using MACs, and three using both computer systems rated PC computers as an important or very important tool for graphic design. On the other hand, two respondents using PCs, seven using MACs, and three using both rated the MAC computer as an important or very important tool for graphic design. To put this in clearer terminology, the business respondents showed high regard for the type of computer that they personally used. Half the respondents using PC computers showed high ratings for Photoshop. Half of the respondents using MAC computers showed high ratings for Photoshop, QuarkXPress, Adobe InDesign, and Adobe Illustrator. Over half of the businesses that used both types of computers showed high ratings for Photoshop, QuarkXPress, Adobe PageMaker, CorelDRAW, and Adobe Illustrator.

Likewise, the business respondents were asked to rate how important the two computer systems and the 10 software programs were according to their anticipated use in the graphic design industry. It was reported in question 10 of Table C.1 that nine respondents using PCs, one using a MAC, and four using both computer systems rated PC computers as an important or very important tool for graphic design. On the other hand, four respondents using PCs, five using MACs, and four

using both rated the MAC computer as an important or very important tool for graphic design. To clarify, a higher percentage of the businesses that used MACS or both computers showed high ratings for the anticipated use of the MAC computer in the graphic design industry. Nearly half the business respondents using PC computers showed high ratings for Photoshop, while half of the respondents using MAC computers showed high ratings for Photoshop and QuarkXPress. Over half or all of the business respondents using both types of computers showed high ratings for Photoshop, QuarkXPress, Adobe PageMaker, and Adobe Illustrator. When the business respondents were given the option to add their own choice for computer software that is currently used and anticipate being used in the graphic design industry, three names included were: Adobe Premier, FreeHand, and Fireworks.

Finally, the businesses were given the option to present any concerns and recommendations for this study. Three businesses responded with comments that need to be considered. The first stated that, "The biggest problem in hiring designers in the GF market is lack of talent. Computer skills are great & necessary, but without talent they are really useless in graphic design. I'd like to see designers who can design first without the computer - then translate those design skills into the digital platform. Technology can't replace a good eye." The second stated, "I think graduating senior should have much more hands on experience in work studies, etc. Once you look for a job you need more experience than what the classes give you." And the third stated, "The PC is a terrible platform for graphic design. Adobe InDesign (Quark Killer) is the future for print house use of graphics software. When hiring, CMYK color conversion and previous 4 color process artwork are looked for." Because a majority of the responses given did not pertain to the context of this study, the full responses are presented in Appendix G.

Table C.1 Comparison Between 32 Businesses Surveyed That Own PC, MAC, or PC/MAC Platforms

SURVEY QUESTION	BUSINESSES WITH PC	BUSINESSES WITH MAC	BUSINESSES WITH BOTH
6. Businesses that currently use:			
PC Platform	16	0	0
MAC Platform	0	9	0
Both PC and MAC Platform	0	0	5
Businesses that anticipate using:			
PC Platform	1- Pentium III	0	0
MAC Platform	0	0	0
Both PC and MAC Platform	0	0	1-Pentium III
7. Businesses hiring graphic designers with previous platform experience.	11	3	3
Windows	10	2	4
OS/2	0	1	1
Linex	0	2	0
Other	0	1-Any	1-MAC 1-DOS
Photography	3	4	0
Web Page Development	6	4	2
Color Separation/Printing Processes	5	8	3
Other	1-QuarkXPress, Photoshop	1-QuarkXPress, Photoshop, FreeHand, & Adobe Illustrator 2-Original thought and software skills	0
9. Rate PCs according to their current importance:			
Don't Know	1	1	0
Important	2	3	0
Very Important	7	1	3
9. Rate MACs according to their current importance:			
Don't Know	7	0	0
Important	1	0	0
Very Important	1	7	3
9. Rate Photoshop software according to importance:			
Don't Know	4	0	0
Important	4	2	1
Very Important	4	7	4

Table C.1 (Continued)

9. Rate PowerPoint software according to importance: Don't Know Important Very Important	6 0 3	3 0 0	0 2 0
9. Rate QuarkXPress software according to importance: Don't Know Important Very Important	7 3 2	2 1 5	0 1 3
9. Rate Adobe PageMaker software according to importance: Don't Know Important Very Important	4 3 1	0 2 1	0 2 1
9. Rate Dream Weaver software according to importance: Don't Know Important Very Important	11 1 0	3 0 0	1 0 1
9. Rate Microsoft FrontPage software according to importance: Don't Know Important Very Important	8 0 2	3 0 0	0 0 0
9. Rate Corel WordPerfect software according to importance: Don't Know Important Very Important	4 2 1	2 0 1	0 0 0
9. Rate CorelDRAW software according to importance: Don't Know Important Very Important	5 4 2	2 0 3	0 2 1
9. Rate Adobe InDesign software according to importance: Don't Know Important Very Important	6 2 1	2 1 3	0 1 0

Table C.1 (Continued)

9. Rate Adobe Illustrator software according to importance: Don't Know Important Very Important	 5 4 1	 1 1 4	 0 0 4
9. Other Programs	1-Adobe Premier	1-FreeHand 1-DreamMaker, Claris Works, Painter 5.0 1-Microsoft Word	1-FreeHand, Fireworks 1-Freehand 8 1-Bryce 4
10. Rate PCs according to their future importance: Don't Know Important Very Important	 2 2 7	 0 0 1	 0 1 3
10. Rate MACs according to their future importance: Don't Know Important Very Important	 6 2 2	 1 0 5	 0 2 2
10. Rate Photoshop software according to future importance: Don't Know Important Very Important	 6 4 3	 0 1 6	 0 0 5
10. Rate PowerPoint software according to future importance: Don't Know Important Very Important	 9 1 3	 2 1 1	 0 0 2
10. Rate QuarkXPress software according to future importance: Don't Know Important Very Important	 7 4 2	 2 2 3	 0 1 3
10. Rate Adobe PageMaker software according to future importance: Don't Know Important Very Important	 5 3 2	 1 2 0	 0 1 2

The next three tables take the information from Table C.1 and separates the business respondents according to the computer platform they used. Each table reports how these respondents rated the importance of hardware and 10 software programs according to their current and anticipated use in the graphic design industry. Responses made by respondents who use PC computers are reported in Table C.2, responses made by respondents who use MAC computers are reported in Table C.3, and responses made by respondents that use both types of computers are reported in Table C.4.

Reported in Table C.2, nearly half of the business respondents that used PC platform computers indicated that they believed that PC computers were very important to the current use and to the anticipated use in the graphic design industry. Half of these respondents rated that Photoshop was important or very important to the current use and to the anticipated use in the graphic design industry. Still, over half of the respondents indicated that they didn't know about the importance of any of these choices in the graphic design industry.

Table C.2 Responses Of Businesses Owning PC Platform Computers To Survey Questions That Rated The Importance Of Hardware And Software According To Current And Anticipated Use

HARDWARE & SOFTWARE	DON'T KNOW	IMPORTANT	VERY IMPORTANT
Currently using:			
PC Hardware	1	2	7
MAC Hardware	7	1	1
Photoshop	4	4	4
PowerPoint	6	0	3
QuarkXPress	7	3	2
Adobe PageMaker	4	3	1
Dream Weaver	11	1	0
Microsoft FrontPage	8	0	2

Table C.2 (Continued)

Corel WordPerfect	4	2	1
CorelDRAW	5	4	2
Adobe InDesign	6	2	1
Adobe Illustrator	5	4	1
Anticipated for future use:			
PC Hardware	2	2	7
MAC Hardware	6	2	2
Photoshop	6	4	3
PowerPoint	9	1	3
QuarkXPress	7	4	2
Adobe PageMaker	5	3	2
Dream Weaver	11	0	0
Microsoft FrontPage	8	1	1
Corel WordPerfect	6	3	0
CorelDRAW	7	1	2
Adobe InDesign	9	1	1
Adobe Illustrator	7	3	0

Likewise, in Table C.3 it is reported that nearly half of the business respondents using MAC platform computers believed that MAC computers were very important to the current use and to the anticipated use in the graphic design industry. Over half of these respondents indicated that Photoshop and QuarkXPress were rated important or very important to the current use in the graphic design industry. Over half of the respondents indicated that Photoshop was very important to the anticipated use in the graphic design industry. Additionally, less than half of the respondents reported that they didn't know about the importance of any of these choices in the graphic design industry.

Table C.3 Responses Of Businesses Owning MAC Platform Computers To Survey Questions That Rated The Importance Of Hardware And Software According To Current And Anticipated Use

HARDWARE & SOFTWARE	DON'T KNOW	IMPORTANT	VERY IMPORTANT
Currently using:			
PC Hardware	1	3	1
MAC Hardware	0	0	7
Photoshop	0	2	7
PowerPoint	3	0	0
QuarkXPress	2	1	5
Adobe PageMaker	0	2	1
Dream Weaver	3	0	0
Microsoft FrontPage	3	0	0
Corel WordPerfect	2	0	1
CorelDRAW	2	0	3
Adobe InDesign	2	1	3
Adobe Illustrator	1	1	4
Anticipated for future use:			
PC Hardware	0	0	1
MAC Hardware	1	0	5
Photoshop	0	1	6
PowerPoint	2	1	1
QuarkXPress	2	2	3
Adobe PageMaker	1	2	0
Dream Weaver	3	0	0
Microsoft FrontPage	3	0	0
Corel WordPerfect	3	0	0
CorelDRAW	2	1	0
Adobe InDesign	2	1	2
Adobe Illustrator	1	1	3

Finally in Table C.4, it is reported that over half of the business respondents that used both PC and MAC platform computers believed that PC and MAC computers were very important to the current use and to the anticipated use in the graphic design industry. Over half of these respondents indicated that Photoshop, QuarkXPress, Adobe PageMaker, CorelDRAW, and Adobe Illustrator were rated important or very important to the current use in the graphic design industry. Additionally, over half of the respondents indicated that Photoshop, QuarkXPress, Adobe PageMaker, and Adobe Illustrator are anticipated to be important or very important to the use in the graphic design industry. Most of these believed that they knew something about the software programs with only three businesses indicating that they were unfamiliar with QuarkXPress and one business was unfamiliar with Dream Weaver.

Table C.4 Responses Of Businesses Owning PC And MAC Platform Computers To Survey Questions That Rated The Importance Of Hardware And Software According To Current And Anticipated Use

HARDWARE & SOFTWARE	DON'T KNOW	IMPORTANT	VERY IMPORTANT
Currently using:			
PC Hardware	0	0	3
MAC Hardware	0	0	3
Photoshop	0	1	4
PowerPoint	0	2	0
QuarkXPress	3	1	3
Adobe PageMaker	0	2	1
Dream Weaver	1	0	1
Microsoft FrontPage	0	0	0
Corel WordPerfect	0	0	0
CorelDRAW	0	2	1
Adobe InDesign	0	1	0

Table C.4 (Continued)

Adobe Illustrator	0	0	4
Anticipated for future use:			
PC Hardware	0	1	3
MAC Hardware	0	2	2
Photoshop	0	0	5
PowerPoint	0	0	2
QuarkXPress	0	1	3
Adobe PageMaker	0	1	2
Dream Weaver	1	0	2
Microsoft FrontPage	0	1	0
Corel WordPerfect	0	0	0
CorelDRAW	0	1	1
Adobe InDesign	0	0	1
Adobe Illustrator	0	1	4

Universities

The next section will be an explanation of how the university respondents answered questions focusing on what computer hardware and software programs are currently being used and how they rated these components according to their importance for current and anticipated needs in graphic design. The five university respondents were divided by the computer platform they chose to use. It was reported in Table C.5 that one respondent used the PC platform computer and was looking to upgrade to Windows 2000. Three respondents used the MAC platform computer with one respondent looking to upgrade to a G4 computer. None of the respondents taught with both of the computer platforms. One university respondent chose not to answer this question.

PageMaker, Dream Weaver, Adobe InDesign, and Adobe Illustrator. One university respondent chose not to answer this question.

When the university respondents were given the option to add their own choice for computer software, they included: Freehand, Director, and Fireworks. Question eight and nine asked the university respondents if they had any concerns or recommendations. Two of the respondents gave their opinion on this survey. One respondent believed that, "Expansion of education for print design to now include the Web, multimedia. More interactive graphics." Another respondent believed that, "Yes, all emphasis is on hardware and software. They are only tools and do not address the important issues of becoming a graphic designer. One problem in the graphic design profession is the misconception that a computer is the key to becoming a designer." The full responses are presented in Appendix G.

Table C.5 Comparison Between Five Universities Surveyed That Own PC or MAC Platforms

SURVEY QUESTION	UNIVERSITIES WITH PC	UNIVERSITIES WITH MAC
1. Graphic design program of study:		
Yes	0	2
No	1	1
Not enough student interest	0	0
Not enough resources	1	0
Not enough teachers	0	0
Other	0	0
3. Schools that currently use:		
PC Platform	1	0
MAC Platform	0	3-Power Mac, G4
Both PC and MAC Platform	0	0
Schools that anticipate using:		
PC Platform	1- Windows 2000	0
MAC Platform	0	G4
Both PC and MAC Platform	0	0

Table C.5 (Continued)

6. Rate PCs according to their current importance: Don't Know Important Very Important	 0 0 1	 0 0 0
6. Rate MACs according to their current importance: Don't Know Important Very Important	 1 0 0	 0 0 2
6. Rate Photoshop software according to importance: Don't Know Important Very Important	 0 0 1	 0 0 3
6. Rate PowerPoint software according to importance: Don't Know Important Very Important	 0 0 1	 0 0 0
6. Rate QuarkXPress software according to importance: Don't Know Important Very Important	 1 0 0	 0 1 2
6. Rate Adobe PageMaker software according to importance: Don't Know Important Very Important	 0 0 1	 0 2 0
6. Rate Dream Weaver software according to importance: Don't Know Important Very Important	 0 0 1	 0 2 1
6. Rate Microsoft FrontPage software according to importance: Don't Know Important Very Important	 0 0 0	 0 0 0

Table C.5 (Continued)

7. Rate Adobe Illustrator software according to future importance: Don't Know Important Very Important	 0 0 1	 0 1 2
7. Other	0	1-FreeHand, Director, Fireworks 1-FreeHand
8. Concerns	1	1
9. Recommendations	0	1

The next two tables take the information from Table C.5 and divides the university respondents into categories depending upon the computer platform they used. The information pertaining to the respondent that chose to use the PC platform computer is reported in Table C.6 and the information pertaining to the respondents that chose to use the MAC platform computer is reported in Table C.7.

When the university respondents were asked to rate the computer platforms and the 10 software programs according to their current and anticipated importance in graphic design, it was reported in Table C.6 that the university respondent that used PC platform computers believed that PC computers were very important to the current and the anticipated use in the graphic design industry. This respondent also indicated that Photoshop, PowerPoint, Adobe PageMaker, Dream Weaver, Corel WordPerfect, and CorelDRAW were very important to the current use of programs in the graphic design industry and that Photoshop, PowerPoint, Adobe PageMaker, Dream Weaver, and Adobe Illustrator would be important or very important to the anticipated needs in graphic design.

Table C.6 Responses Of Universities Owning PC Platform Computers To Survey Questions That Rated The Importance Of Hardware And Software According To Current And Anticipated Use

HARDWARE & SOFTWARE	DON'T KNOW	IMPORTANT	VERY IMPORTANT
Currently using:			
PC Hardware	0	0	1
MAC Hardware	1	0	0
Photoshop	0	0	1
PowerPoint	0	0	1
QuarkXPress	1	0	0
Adobe PageMaker	0	0	1
Dream Weaver	0	0	1
Microsoft FrontPage	0	0	0
Corel WordPerfect	0	0	1
CorelDRAW	0	0	1
Adobe InDesign	1	0	0
Adobe Illustrator	0	0	0
Anticipated for future use:			
PC Hardware	0	0	1
MAC Hardware	1	0	0
Photoshop	0	0	1
PowerPoint	0	0	1
QuarkXPress	1	0	0
Adobe PageMaker	0	0	1
Dream Weaver	0	0	1
Microsoft FrontPage	0	0	0
Corel WordPerfect	0	0	0
CorelDRAW	0	0	0
Adobe InDesign	0	1	0
Adobe Illustrator	0	0	1

It was reported in Table C.7 that two of the three university respondents that chose to use MAC platform computers believed that MACs were very important to the current and the anticipated use in the graphic design industry. The three respondents rated Photoshop, QuarkXPress, Dream Weaver, Adobe InDesign, and Adobe Illustrator as important or very important to the current use in the graphic design industry. Additionally, these universities indicated that Photoshop, PowerPoint, QuarkXPress, Adobe PageMaker, Dream Weaver, Adobe InDesign, and Adobe Illustrator were important or very important to the anticipated use in the graphic design industry.

Table C.7 Responses Of Universities Owning MAC Platform Computers To Survey Questions That Rated The Importance Of Hardware And Software According To Current And Anticipated Use

HARDWARE & SOFTWARE	DON'T KNOW	IMPORTANT	VERY IMPORTANT
Currently using:			
PC Hardware	0	0	0
MAC Hardware	0	0	2
Photoshop	0	0	3
PowerPoint	0	0	0
QuarkXPress	0	1	2
Adobe PageMaker	0	2	0
Dream Weaver	0	2	1
Microsoft FrontPage	0	0	0
Corel WordPerfect	0	0	0
CorelDRAW	0	0	0
Adobe InDesign	1	0	1
Adobe Illustrator	0	0	2
Anticipated for future use:			
PC Hardware	0	1	0

Table C.7 (Continued)

MAC Hardware	0	0	2
Photoshop	0	0	3
PowerPoint	0	1	0
QuarkXPress	0	1	2
Adobe PageMaker	0	1	0
Dream Weaver	0	1	2
Microsoft FrontPage	0	0	0
Corel WordPerfect	0	0	0
CorelDRAW	0	0	0
Adobe InDesign	1	0	1
Adobe Illustrator	0	1	2

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Restatement Of The Problem And Objectives

The problem of this study was to discuss the hardware and software that is available to the person specifically interested in graphic design by examining what graphic design software programs and platforms are currently used in the industry and what the anticipated need will be in the future. Five objectives were developed for this study. The first was to include conducting a survey of graphic design businesses to determine needs from current and anticipated programs and platforms. The next was to include conducting a survey of business and educational institutions offering classes in graphic design. The third was to provide a description of current and future needs of hardware and software used for graphic design in businesses. The fourth was to provide a description of current hardware and software used in business and educational institutions. The last objective was to provide recommendations made to the researcher by the businesses and the universities based upon findings of this study.

Summary

In order to provide recommendations based upon the findings of this study, it is necessary to highlight important points of information found in each of the surveys. The only common point that was established when the businesses and universities were surveyed, was that most or all of the respondents' choices that were made were dependent upon the computer system that they selected for use. In the following sections, highlighted points will be extracted from each of the surveys:

Businesses

The surveys that were sent to 82 businesses in the Grand Forks region were sent back by 32 respondents. Sixteen business respondents indicated that they have chose to use PC computer platforms, nine respondents chose MAC computer platforms, and five respondents chose to use both platforms. Sixteen of the respondents rated PC computer platforms and 12 of the respondents rated MAC computer platforms according to their current use in graphic design to be important or very important. Likewise, 14 of the respondents rated PC computer platforms and 13 of the respondents rated MAC computer platforms according to their future use in graphic design to be important or very important.

With hardware and software becoming more available and cheaper to buy, five business respondents indicated they have no need to hire additional personnel because their own staff can supply most of what the business needs for graphic design. Three of those business respondents indicated that the demand for graphics designers is so small that the cost of hiring additional personnel is not justifiable for the cost that is passed on to the consumer. When the businesses were asked if they came to a place where they would need the assistance of a graphic designer for a short term assignment, seven respondents indicated that a local printing or advertising firm would be contracted for that need. If the graphic designer was needed for a long term assignment, the company would then decide to hire either a part time or full time employee depending on the duration of the need.

Business respondents specified that they would consider an individual for employment as a graphic designer if they could display certain skills on computer hardware and software. These skills (not listed according to importance) would include:

- Previous skills on both the PC and MAC computers, specifically using the Windows operating system.
- Photography skills.

- Web page development.
- Color separation and printing processes.
- Formal academic training in color theory and design skills.
- Creative and original thought.

When the 32 business respondents rated the 10 computer software programs according to their importance to those currently used in graphic design, the following were rated important or very important by at least half of the businesses that currently used PCs, MACs, or PC/MACs:

- Photoshop was chosen by eight out of 16 PC users, nine out of nine MAC users, and five out of five PC/MAC users.
- QuarkXPress was chosen by six out of nine MAC users, and four out of five PC/MAC users.
- Adobe PageMaker was chosen by three out of five PC/MAC users.
- CorelDRAW was chosen by three out of five PC/MAC users.
- Adobe InDesign was chosen by four out of nine MAC users.
- Adobe Illustrator was chosen by five out of nine MAC users, and four out of five PC/MAC users.
- Other programs that were indicated as important were:
    - Adobe Premier
    - FreeHand
    - Fireworks
    - Dream Maker
    - Bryce 4
    - Claris Works
    - Painter 5.0

When the 32 business respondents rated the 10 computer software programs according to their importance to anticipated use in graphic design, the following were rated important or very important by at least half of the businesses that currently use PCs, MACs, or PC/MACs:

- Photoshop was chosen by seven out of 16 PC users, seven out of nine MAC users, and five out of five PC/MAC users.
- QuarkXPress was chosen by five out of nine MAC users, and four out of five PC/MAC users.
- Adobe PageMaker was chosen by three out of five PC/MAC users.
- Adobe Illustrator was chosen by five out of five PC/MAC users.
- Other programs that were indicated as important were:
    - Adobe Premier
    - FreeHand
    - Fireworks

At the end of the survey, respondents were given an opportunity to respond to the survey with recommendations. The following are taken from those that are pertinent to this study.

- "The biggest problem in hiring designers in the GF market is lack of talent. Computer skills are great & necessary, but without talent they are really useless in graphic design. I'd like to see designers who can design first without the computer - then translate those design skills into the digital platform. Technology can't replace a good eye."
- "I think graduating senior should have much more hands on experience in work studies, etc. Once you look for a job you need more experience than what the classes give you."

- "The PC is a terrible platform for graphic design. Adobe InDesign (Quark Killer) is the future for print house use of graphics software. When hiring, CMYK color conversion and previous 4 color process artwork are looked for."

Universities

The surveys that were sent to 12 universities in the Grand Forks region were returned by five respondents. One university respondent indicated that they have chose to use PC computer platforms, three respondents chose MAC computer platforms, and no respondents chose to use both platforms. When asked if the schools would provide a program of study for graphic design, the university that used PC computer platforms indicate that they would not because there was not enough resources available. On the other hand, two out of the three universities that chose to use MAC computer platforms indicated that they would and the other indicated that they would not without giving a reason.

One respondent rated PC computer platforms and two of the respondents rated MAC computer platforms according to their current and anticipated use in graphic design to be important or very important.

When the five university respondents rated the 10 computer software programs according to their importance to those currently used in graphic design, the following were rated important or very important by at least half of the universities that currently used PCs or MACs:

- Photoshop was chosen by the PC user and all three of the MAC users.
- PowerPoint was chosen by the PC user.
- QuarkXPress was chosen by all three of the MAC users.
- Adobe PageMaker was chosen by the PC user and all three of the MAC users.
- Dream Weaver was chosen by the PC user and all three of the MAC users.
- Adobe InDesign was chosen by one of the MAC users.

- Adobe Illustrator was chosen by two of the MAC users.
- Other programs that were indicated as important were:
    - FreeHand
    - Fireworks
    - Director

When the five university respondents rated the 10 computer software programs according to their importance to anticipated use in graphic design, the following were rated important or very important by at least half of the universities that currently use PCs or MACs:

- Photoshop was chosen by the PC user and all three of the MAC users.
- PowerPoint was chosen by the PC user.
- QuarkXPress was chosen by all three of the MAC users.
- Adobe PageMaker was chosen by the PC user.
- Dream Weaver was chosen by the PC user and all three of the MAC users.
- Adobe InDesign was chosen by the PC user.
- Adobe Illustrator was chosen by the PC user and all three of the MAC users.
- Other programs that were indicated as important were:
    - FreeHand
    - Director
    - Fireworks

At the end of the survey, university respondents were given an opportunity to respond to the survey with recommendations. The following are taken from those that are pertinent to this study.

- "Expansion for print design to now include the Web, multimedia. More interactive graphics."

- "Yes, all emphasis is on hardware and software. They are only tools and do not address the important issues of becoming a graphic designer. One problem in the graphic design profession is the misconception that a computer is the key to becoming a designer."

Conclusion

In order to help individuals who want to obtain a career in graphic design and gain the respect of businesses, a bridge of communication and cooperation needs to be built between the businesses and the universities within this region. In the past, these two groups have remained separate and are traveling a path that is slightly parallel to one another. At the same time the span between them is growing farther apart. Each group is expecting the other to supply for a demand that has been overlooked or has not been clearly defined. In 37 total responses, this study has shown that there is not one place where the two groups agree 100 percent. Each business or university has developed hardware and software packages that meets their own individual need based on research they have completed and might find commonality with a few others.

Within this scenario, a problem arises. When the need arises for a business to hire a graphic designer, they are looking for someone with specific skills which are required by the computer hardware and software they chose to use based on it's performance, availability, and cost. The universities also have arranged classes within their programs of study to be based upon current need by the graphic design industry, demand by students, availability of teachers, and availability of providing the class at a low cost to the students. The problem with these situations is that the businesses may not find someone specifically skilled to meet their need and the students may not be able to find an employer that is looking for their specific talent.

Skills that are required by businesses need to be met by courses included in a program of study offered at the universities and the skills learned at the universities need to be reinforced by experience

achieved by working within the business environment. The goal of training knowledgeable and experienced individuals for the graphic design industry can be achieved by joining these two groups together by forming an advisory committee that will form a partnership between the two groups and share information concerning the future of graphic design in the Grand Forks region. Through cooperation, common goals and objectives will be defined, strengthened, and achieved for the benefit of all who are involved.

Comparing currently used software programs used by businesses and universities, the following programs were rated (not ranked) important or very important in graphic design:

- Photoshop
- QuarkXPress
- Adobe PageMaker
- Adobe InDesign
- Adobe Illustrator
- FreeHand
- Fireworks

Comparing anticipated use of software programs used by businesses and universities, the following programs were rated (not ranked) important or very important in graphic design:

- Photoshop
- QuarkXPress
- Adobe PageMaker
- Adobe Illustrator
- FreeHand
- Fireworks

Graphic design programs of the future indicate little change from those currently used. Adobe InDesign will be a program that will be phased-out but the other programs will still be utilized by industry and universities.

With respect to computer platforms, businesses are currently using a mix of PC and MAC platforms. Future platforms indicates there will be no change from what they are currently using. On the other hand, universities are currently dominated by the MAC platform and future platforms also indicate no change.

Graphic design businesses and universities have a common ground in software but differ in platforms; businesses are mostly PC based and universities are MAC based.

Recommendations

Based on the review of literature and the two surveys that were conducted, the following recommendations were compiled:

- It is recommended that an advisory committee consisting of individuals from businesses and universities be formed to establish common software, hardware, and platform standards that meet the needs of the graphic design industry of today and tomorrow.
- In order to meet the requirements made by graphic design businesses, it is recommended that the following curriculum be offered by universities:
  - Art History
  - Color Theory
  - Design Layout
  - Printing Color Separation Techniques
  - Publication Design
  - Photography Processes And Equipment

- Computer Software Training
- Web Page Development
- Multimedia

- It is recommended with respect to Web page design and using the Internet, businesses need to be informed or appraised of the value of a Web page and how to use it.
- It is recommended that a co-op experience for graphic design students be encouraged.
- It is recommended that a study be conducted to other regions (Minneapolis, Fargo, and Bismarck) to determine the needs of graphic design businesses and how universities are meeting those needs.

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