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DISSERTATION

USING MULTIMEDIA TO TRAIN PRE-SERVICE ART TEACHERS
IN THE GRAPHIC DESIGN CONTENT AREA

Submitted by

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School of Education

In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

Colorado State University

Fort Collins, Colorado

Summer, 2002

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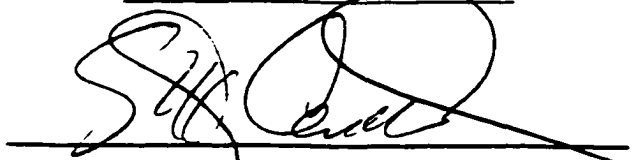
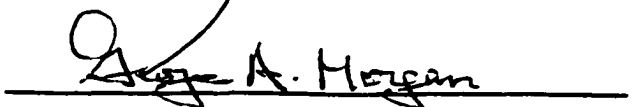
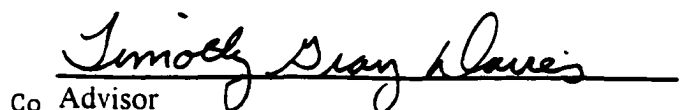
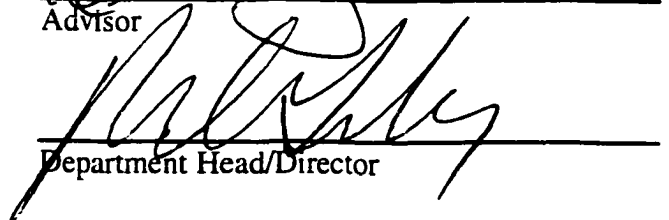
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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER
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MULTIMEDIA TO TRAIN PRE-SERVICE ART TEACHERS IN THE GRAPHIC
DESIGN CONTENT AREA BE ACCEPTED AS FULFILLING IN PART THE
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

Committee on Graduate Work

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Department Head/Director

ABSTRACT OF DISSERTATION

STRANGER, NANCY K. Using Multimedia to Train Pre-Service Art Teachers in the Graphic Design Content Area. (Under the direction of Dr. Duane Jansen and Dr. Timothy Davies).

This study investigated the use of a web-based multimedia teaching tool about graphic design and related careers with pre-service art teachers. The study examined attitudes and beliefs of 30 pre-service art teachers from Colorado State University and the University of Northern Colorado about including graphic design content in the high school fine art curriculum. The respondents' attitudes about jobs and availability of jobs for artists, as well as the importance of technology in the art curriculum were also surveyed. Instruments developed by the researcher for the study included an attitude scale, an objective test, and a web-based multimedia teaching tool. A quantitative associational design was used for the research, and the data collected were analyzed using descriptive statistics and bivariate correlations.

The findings indicate that pre-service art teachers believe graphic design should be taught in high school fine art programs and that artists and art teachers need to know how to use and teach with technology. A correlation was found between a self-reported level of technology expertise and a need for further technology training. Another correlation was found between the self-reported level of technology expertise and the need to know how to use technology.

The American education system is currently undergoing major reform as a result of new computing technologies. Teachers are encouraged to be ready to use and teach with technology, and teacher training programs must address this issue. The art curriculum is not an exception to this initiative, and art teachers who use technology will find there are many ways to present and expose students to art content. The multimedia teaching tool about graphic design developed for this study is but a beginning in the exploration of possibilities of technology integration with the arts.

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At the beginning of this journey I had no idea how much territory would be covered. It has been an immense and amazing trip. Although sometimes difficult, I would not trade the experience for anything, for it has been an especially valuable and worthwhile endeavor, made possible through the support of many.

First I must thank Dr. Jansen, my advisor, who has been with me from start to finish. I promised to complete this journey in a timely fashion so he could retire, and I feel privileged to have had the benefit of his wisdom throughout the process. A sincere thank you goes to Dr. Davies, my co-advisor, who taught me so much about community colleges. Dr. Morgan has seen me from my first glimpse of the quantitative research process through the finished pages of this dissertation, and I truly appreciate his patience and perseverance. Dr. Anderson has been an inspiration and motivation from the start: my first course with her provided a solid foundation for the road ahead. And finally, sincere thanks to John Gravdahl of the CSU Art Department, whose knowledge of graphic design was a significant contribution to the development of the multimedia teaching tool.

The support of family and friends has been important for the successful completion of the journey. This finished work is dedicated to four outstanding women who share my life. My daughter Abby has listened to every detail of my travels and inspired me through some

of the more difficult times: my sister Barbara has supported me lovingly and completely over the years: my sister Patty, now deceased, strongly encouraged me at the start of the journey: and my best friend Roselan has given me the gifts of time, motivation and endless kindness. My colleagues and students at Colorado Mountain College have been supportive along the way, and now celebrate with me the conclusion of the journey. My parents, along with other family and friends have contributed to the process and thereby enriched the experience. I want to especially thank Andrew, who patiently gave me daily encouragement and support throughout some of the most difficult weeks of the writing process.

Reaching the end of this journey is for me one of life's important milestones: a time to be treasured and celebrated. It is now time to move forward and use new knowledge and skills for the greatest benefit of teaching and learning. May our paths continue to be intertwined.

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CHAPTER 1

INTRODUCTION

Background

In today's world there are more ways of communicating than ever before. Rapid advances in new computing technologies have dramatically expanded the ability of humans to communicate with one another. Along with traditional print-based materials, the World Wide Web and film are forms of visual communication that have multiplied exponentially with the growth of technology. The need for graphic designers, or workers who are trained to create and produce designs for print, web, and film is growing at an astounding pace, creating a shortage of workers in the visual communications industries (Regan & Associates, 1999).

Art, as well as language is a necessary means of expressing ideas. The arts are a basic and central medium of human communication and understanding (Williams, 1995). The importance of verbal and visual communication cannot be overemphasized, as society cannot advance without an ongoing exchange of information. Rapid transmissions of information over long distances and ready access to information have become conspicuous and important features of modern society. A global telecommunications and data network is growing and shaping world economic enterprise. Global data transmission has accelerated the spread of trans-national corporations, which play a significant role in the world economy (Johnson & Nissenbaum, 1995).

While business used to be a fairly simple process that involved a meeting and conversation of people in the marketplace, new digital communication technologies are bringing faster and expanded connections. The rapid advances in technology and the

globalization of markets have changed the way goods and services are produced and distributed (Dutton, Buchta, Leary & Edling, 1997). High-speed computers and high bandwidth fiber optic cabling offer significant expansion of a network's capacity for communicating by transmitting data. This data, or digitized information, comes in the form of moving and still images, sound, and text. The Internet, which was once primarily the domain of computer scientists and mathematicians, has evolved into an important and accessible source of communication for the world population.

While traditional communication modes are primarily word based, visual communications incorporate words and images. Digital communication technologies combine moving and still images with text. The International Graphic Arts Education Association defines graphic communications as:

"The process and industries that create, develop, produce, and disseminate products utilizing or incorporating words or pictorial images to convey information, ideas, and feelings. Graphic communication products facilitate learning, enjoyment, motivation, and commerce. Graphic communications includes the family of market segments embracing the technologies of printing, publishing, packaging, electronic imaging, and their allied industries; they are often referred to as the graphic arts, print, or imaging industries" (Dailey, 2000, p. 1).

Graphic designers are individuals who are trained to use a combination of words and pictures to convey a message to meet the needs of a client. Although graphic designers have traditionally been associated with the printing industry, creating two-dimensional designs for book covers, brochures, advertisements, posters, and other printed pieces, graphic designers are now called upon to design for the Internet, for special effects in films, and for the video game industry.

Need for the Study

Because the preparation of students to become productive adults is a major aim of schooling, it is logical to look to the work world to see what skills students need to develop (Gallagher, 2001). The demand for graphic designers, or workers who can communicate clearly at a visual level, has risen across the nation. This growing shortage of workers in the graphic design industry will persist unless more workers can be identified and trained, and a logical source of workers for this field is school art programs.

Koroscik (1990) found that novice teachers tend to compartmentalize their knowledge, often separating content from classroom management techniques. According to Kagan (1992) novice teachers are more concerned with the technical, generic elements of teaching (i.e. classroom management and instructional routines) than with the content-related dimensions of teaching. Participants in a study conducted by Kowalchuk (1999) indicated that art content, teaching strategies, classroom management, and student learning were areas where pre-service art teachers need to learn more. The Kowalchuk study found that art content was a substantial challenge for student teachers, and Short (1998) noted that art curricular models vary, often depending upon the teacher's personal interest and education background.

The content of art education programs and courses is planned to introduce prospective teachers to a variety of art processes, to a consideration of pedagogical issues, and to an understanding of what constitutes artistic learning. Grauer (1998) noted that the beliefs and attitudes about teaching specific content areas are powerful influences on the practice of future teachers and that beliefs about the nature and content of a discipline are likely to influence decisions of practice. According to Day (1996) a teacher's style or approach to

teaching is a result of the teacher's personal set of values, beliefs about education, understanding of students, and knowledge of content.

What art teachers know and can do is the most important influence on what students learn (PBS TeacherSource, 1999). Art teachers are unlikely to include in their curriculums content areas that were not covered in teacher training. Also, content areas are usually not included if a teacher holds a negative attitude or belief about that area. The inclusion of graphic design in high school art curriculums is important because knowledge about this content area may lead students to pursue continued studies and potential career opportunities. Yet high school students may be making higher education and career choices without the benefit of instruction or information about the field of visual communications because their teachers did not receive graphic design training, or may hold the attitude that graphic design does not belong in the fine art curriculum. Furthermore, a teacher may have the belief that graphic design is vocational or "applied art" and is more appropriate content in a vocational program.

Graphic design jobs all share some commonalities: they depend on visual imagery for successful operation and need skilled, creative, and adaptable employees able to work in teams. The study of art has been often promoted as meaningful and important for its impact on the study of other subject areas and development of a whole person, but it rarely has been promoted because of its association with well-paying jobs or careers. ArtsEdNet (1999) supports art education for workplace success, recognizing that arts teach creative thinking, problem-solving, risk-taking, teamwork and communication skills.

As increasing numbers of businesses experience an unfilled need for workers who have a strong sense of design and technology expertise, schools must respond with

curriculum that addresses the need. The dramatic growth in visual communication technologies has created a unique moment in history for artists. The combination of new digital technologies with the foundations of basic drawing, design and creative thinking has been instrumental in the development of jobs for artists that were unheard of not many years ago. Including graphic design content in the high school art curriculum could potentially motivate students to further pursue this field of study, given that there are clearly jobs and these jobs require both art foundations and technology training.

If visual communications are to be understood, they must be designed and produced by someone who has attained the skills to do it effectively. The type of worker who has learned these skills is called a “graphic designer.” Graphic design education should be introduced at the secondary level and should take place in the art department, because that is typically where creative and talented students can be found. An introduction to the field of visual communication and its many associated careers will not take place in the art department unless the art teacher has the desire and the ability to include this content area in the curriculum. For the desire to be there, the high school art teacher must hold the belief that graphic design content belongs in the fine art curriculum. The ability to include graphic design content in the art area means that the teacher has access to necessary hardware and software and sufficient technology training or an alternative means to deliver the content.

Problem Statement

Secondary art teachers are called upon to teach a broad range of mediums. any one of which could constitute an entire career for a professional artist. Teaching graphic design, including the technology aspect of the industry, would be a difficult task for many high school art teachers who are already busy teaching (and have a level of proficiency in) painting, sculpture, pottery, glass and metals. Some teachers may not believe that graphic design belongs in the art curriculum, while others might find limited access to computer labs for their students. Furthermore, regardless of the teacher's belief or the accessibility of computers, the teacher may not feel able to teach the complex software that graphic designers use. This study looks at the use of a multimedia teaching tool to overcome these obstacles.

Objectives of the Study

The objectives of this study were to (a) examine the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum, (b) examine the beliefs of pre-service art teachers about jobs and availability of jobs for artists, (c) examine beliefs about the importance of artists and art teachers to know how to use technology, (d) examine computer/technology expertise and prior computer courses of pre-service art teachers, (e) examine what pre-service art teachers learned from a multimedia teaching tool and their attitudes about it, (f) explore the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum, and (g) examine the need for further technology training. In addition, this study examined several of the associations between these concepts.

Research Questions

Based on the objectives of the study and review of literature, the following nine research questions were established.

Research Question 1

What are the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum?

Research Question 2

What are the beliefs of pre-service art teachers about jobs and availability of jobs for artists?

Research Question 3

What are the beliefs of pre-service art teachers about the importance of artists and art teachers knowing how to use technology?

Research Question 4

How do pre-service art teachers rate their expertise and background for using computers/technology?

Research Question 5

How did pre-service art teachers answer 35 separate items of an objective test about graphic design and related careers?

Research Question 6

What are the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum?

Research Question 7

Did pre-service art teachers believe they would need more training to use the multimedia teaching tool?

Research Question 8

Are there any significant relationships among the seven constructs described in chapter 3?

- I. Attitudes about where graphic design should be placed in high school curriculum.
- II. Perceptions about jobs and availability of jobs for artists.
- III. Beliefs about the importance of artists and art teachers to know how to use technology.
- IV. Computer/technology expertise and prior computer courses
- V. Knowledge of graphic design
- VI. Viability
- VII. Concluding attitudes

Research Question 9

Is there a relationship between age and gender of pre-service art teachers and the seven constructs?

Significance of the Research

This study will add yet another dimension to the limited amount of published research regarding art and graphic design. The findings of the study will show the importance of requiring courses in graphic design and technology in the university curriculum for art

education degrees, thereby prompting the inclusion of a curriculum segment about graphic design and related careers in secondary art programs.

During this era of “integration,” “applied academics,” and “school-to-career,” it is an important time to look for gaps in traditional curriculum. According to Grubb (1997) “high school programs should be carefully structured to provide opportunities for career exploration.” Although typically careers in the arts have been limited, careers in visual communications are currently numerous and varied due to advances in technology, and a shortage of workers in this field is evident (Regan & Associates, 1999).

The omission of graphic design basics and discussion of its related careers at the high school level is an injustice for students desiring to work in an art-related field. According to the International Council of Fine Arts Deans (ICFAD, 1993), in order for higher education to continue the process of educating students in the arts at an appropriate level, students must have a basic understanding and comprehension of the arts prior to undertaking college study.

As technology continues to play an ever-increasing role in education, this study will show why it is valuable for art educators to understand how technology can be used along with fine arts to begin the process of educating students who will potentially address the worker shortage in the field of visual communications. The study will demonstrate a way for art teachers to include graphic design in their curriculums without purchasing expensive technology and thoroughly learning its use. The inclusion of graphic design information in the high school art curriculum can serve to help students make an informed decision about pursuing further studies in art by providing an introduction to an important and growing field.

Assumptions

This study assumes that respondents reflected their honest beliefs about their attitudes concerning the placement of graphic design content in fine art or vocational programs. There is also an assumption that respondents were accurate in their self-reported levels of computer expertise.

Delimitations

Although there are many definitions of what graphic design is and descriptions of the work performed by graphic designers, for the purpose of this study graphic designers are considered to be artists who use visual media to convey a message to an audience. These artists use typography along with images to meet the needs of a client. Some examples of such clients would be corporations, retail stores, advertising design and publishing firms. In this study “graphic designers” are different from “fine artists” because they create their work for a different purpose. The purpose of art created by graphic designers is generally commercial, while the purpose of art created by fine artists is “art for art’s sake” or beauty for the culture.

The subjects in this study were delimited to pre-service art teachers from two Colorado universities that offer degrees in art education. Different states have different educational standards for fine and performing arts, as well as criteria for teacher certification; however, this study is delimited to the State of Colorado.

Definition of Terms

The following terms were used in the research study. The definition of these terms is relevant for a clear understanding of art, graphic design, and technology as used in the study.

Browser: A software device that enables users to view and navigate Web pages and access text, graphics, video, audio on the Internet. Netscape Navigator, Mosaic, and Internet Explorer are common browsers.

Career: The totality of work, both paid and unpaid, one does in one's lifetime.

Communication: The process of transmitting and receiving ideas, information, and messages. In Latin, communicate means to share or make companion.

Computer art: The set of technologies used to create art with computers. Art or designs created using such technologies.

Fine art: Fine (or visual) art is art produced or intended primarily for beauty rather than utility. Fine arts consist of drawings, paintings, and sculptures that are admired for their beauty.

Graphic design: Graphic design is the application of art and communication skills to the needs of business and industry.

Graphic designer: An artist who uses visual media to convey a message to meet the needs of a client.

Illustration: Illustration is a specialized area of art that generally uses nonphotographic images, often representational, to make a visual statement. Illustrations are created for commercial reproduction, generally to enhance a printed piece.

Image: A reproduction of the form of a person or object; an optically formed duplicate, counterpart, or other representative reproduction of an object. In this text the word image refers to either illustration or photography.

Internet: A collection of networks which interconnect world-wide using the same communication protocol called Transmission Control Protocol (TCP/IP).

Multimedia: The merging of separate media such as text, graphics, photographs, sound, animation, video and interactivity, that allows associations or links between the various elements.

Online: The act of a user being connected to a network system of computers.

Pre-service teacher: A student enrolled in a teacher preparation program.

Technology: A term for the processes by which human beings fashion tools and machines to increase their control and understanding of the material environment. The term is derived from the Greek words *tekhnē*, which refers to an art or craft, and *logia*, meaning an area of study. Therefore, technology means, literally, the study or science of crafting.

Technology integration: This term means that computers and other technologies are used regularly to support the tasks of teaching and learning.

Typography: The term typography refers to the selection and arrangement of type elements in a design. Typographic skill requires a thorough understanding of various types, typefaces, type measurement, and formats available for presenting a printed message.

Visual communication: The visual exchange of thoughts, messages or information. A visual or seen method of communication.

World Wide Web (Web): A hypermedia information retrieval system linking a variety of Internet accessible documents and data files (text, graphics, audio, and video. Often referred to as “WWW.” Uses Hypertext Transfer Protocol (HTTP) in conjunction with TCP/IP protocols to transport documents and files across the Internet.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The objectives of this study were to (a) examine the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum, (b) examine the beliefs of pre-service art teachers about jobs and availability of jobs for artists, (c) examine beliefs about the importance of artists and art teachers to know how to use technology, (d) examine computer/technology expertise and prior computer courses of pre-service art teachers, (e) examine what pre-service art teachers learned from a multimedia teaching tool and their attitudes about it, (f) explore the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum, and (g) examine the need for further technology training. In addition, this study examined several of the associations between these concepts.

Junior and senior level college students preparing to become secondary art educators are good subjects for this study because they have completed at least half of their pre-service art teacher training, have attained some specialized areas of content interest, and have formulated some beliefs about the nature of teaching art.

It is from the study of art that designers must find the historical perspective and fundamental elements to develop the eye to be able to see what looks good to an audience, and it is art educators who teach and inspire future artists. The literature reveals

that art teachers generally include content according to their own areas of special interests and aptitudes. For example, a teacher who is a talented sculptor will likely focus curriculum on 3-dimensional design and particularly sculpture, while an art teacher who excels at painting will strongly promote painting activities. According to Kaplan and Owings (2001), teacher knowledge is the most important factor influencing what students learn.

Little could be found in the literature that specifically studies the relationship between fine art and graphic design, or how art teacher training programs address the integration of technology and graphic design in the curriculum of pre-service art teachers. The placement of graphic design education in school curriculum varies, and although pre-service art teachers may study how to integrate technology in the curriculum, they may not specifically study the field of graphic design.

Students of the arts are usually creative individuals, and it is that creativity which provides an important foundation for all kinds of visual problem solving. Gardner (1993) defined a creative individual as “a person who regularly solves problems, fashions products, or defines new questions in a domain in a way that is initially considered novel but that ultimately becomes accepted in a particular cultural setting” (p. 35).

Art teachers and art students are often individuals who are creative. Art and design education is fundamentally concerned with creativity: developing the capacity for it, and learning to appreciate its manifestations. The quality of creativity is highly valued, but not always well understood. The measurement of creativity has been studied often with many diverse approaches. According to Beveridge (1960), creativity is the ability to

see connections and relationships where others have not. Heinzen (1991) claimed that a broad knowledge base is necessary for creative responses to occur.

Essentially the design process is a problem-solving process, and a designer, like a laboratory scientist, will be most successful if the problem is approached in a systematic manner (Beveridge, 1960). Successful artists generally follow the same pattern in developing creative ideas, though they may be less conscious of the process. Just as the concept of creativity is founded upon intellectual, perceptual, conceptual and sensory experience, teaching and learning experiences must also be designed to reflect this mutuality.

Art and Technology

From the earliest development of paint to today's electronic media, artists have and will continue to make use of technology. Technology has long been thought of as the product or artifact used as a tool for the ideas of science. However, art has also benefited from the products of technology as the tools and materials that have allowed artists to express themselves throughout history have been derived as a product of technology (Natoli, 1999).

Although a traditional dichotomy has always existed between the quantitative origins of computers and the subjective and expressive nature of art, computer technology has become increasingly more sophisticated in its application and can now serve as a viable and productive component of art education (Matthews, 1997).

Fine and Applied Art

The distinctions between fine and applied art are frequently blurred, particularly in a historical sense. Professional graphic art and fine art share the elements of structure,

texture, scale and color. According to Milton Glaser, an acclaimed artist and graphic designer, the most significant difference is the fundamental intention that illuminates each form of activity; fine art metaphysically transforms man, while commercial graphic arts convey information of a specific kind that motivates the viewer towards action (Rotzler, 1983).

Milton Glaser (2001) in a keynote address to the Society of Illustrators noted:

“The core distinction between the high and applied arts may be based on the community need to be told the truth. Freed from the need of commerce or client, the fine artist can more easily serve his or her vision of what is true. In this regard the practice of the fine arts implies a moral or religious obligation. In reality collectors, peers, museums, dealers, critics, foundations, all create powerful expectations that can influence any fine artist. After all, we all must find a way to make a living. In any event, it is essential to maintain the ethical center of both illustration and painting and not succumb to the hierarchical nonsense that elevates the painter into a position of moral superiority. Both practices should aspire to do no harm” (p. 1).

Being a creative artist is a cornerstone of being a successful graphic designer, as all visual problems apply to both fields, thereby making it difficult to maintain the distinction between the activities. Marshall Arisman graduated from Pratt Institute in 1960. He claims that an unwritten formula used by students to pick either fine or commercial majors was well known: “1) Fine art is pure, 2) Illustration is the beginning of selling out, 3) Graphic design is commercial art, and 4) Advertising is selling—period” (Heller & Arisman, 2000, p. 3).

Many artists have the belief that fine art is a more “pure” form of art, and it is often touted as superior to applied art. An art history text by H. W. Janson (1991) goes so far as to say “If the would-be artist senses that his gifts are not large enough for him to succeed as a painter, sculptor, or architect, he may take up one of the countless special fields known collectively as ‘the applied arts.’ There he can be fruitfully active in less

risky work – illustration, typographic design, industrial design, and interior design, for example” (p. 49).

Janson (1991) further stated that these pursuits “provide some scope for originality to their more ambitious practitioners, but the flow of creative endeavor is cramped by such factors as the cost and availability of materials or manufacturing processes, accepted notions of what is useful, fitting, or desirable; for the applied arts are more deeply enmeshed in our everyday lives and thus cater to a far wider public than do painting and sculpture. Their purpose, as the name suggests, is to beautify the useful – an important and valued end, but limited in comparison to art pure-and-simple” (p. 50).

A textbook such as Janson’s, which clearly states that applied arts are an inferior art form, contributes to the problem of the image of graphic design as well as its placement in the system of art education. Although some schools do include graphic arts in the fine arts curriculum, others offer it in vocational/technical settings, where it is often associated with printing technology programs.

The subject of graphic design in the educational system has been relegated to the status of “applied art” primarily because of its early relationship to the printing industry where graphic designers prepared documents for the press. Although modern graphic design still addresses the needs of printed communication it must also recognize and respond to the rapidly growing fields of web and film design, including global digital communications.

History of Art Education

The reform movements of the 1980s triggered numerous demands to reexamine and reform the way students and their teachers are educated. Historical studies in art

education became popular in the 80's; these studies have shown that art education is not simply what goes on in the typical art classroom, but rather a complex of interactions, beginnings, blendings, transformations and declines, an ever-changing process of patterns with no precise outline (Soucy, 1990).

Efland (1990a) explains in A History of Art Education that at various times and places advocates like Charles Perkins, William Harris and John Dewey were successful in securing an integral role for art education in the curriculum. Although cycles of including and excluding art in the curriculum have persisted, over time art has enjoyed a vague sense of being valuable (Siegesmund, 1998).

There was no historical research in art education presented at the 1965 Penn State Seminar in Art Education for Research and Curriculum Development, indicating the lack of importance the profession attached to its history at the time (Efland, 1990a). Although there were a few studies published between 1950 and 1970, the history of art education lagged behind the mainstream by more than a decade. The published proceedings of the 1985 Penn State conference showed that historical art education researchers were narrowly confining their discussions to ideas in art education without adequate acknowledgement of social contexts within which those ideas were expressed. Although art education plays a unique role in the process by which a culture transmits itself across generations, it has yet to address the current educational concerns of class, gender, race, culture and ideology (Smith, 1996).

King and Brownell (1966) introduced the characteristics of "disciplines" and described them as "communities of scholars who share a domain of intellectual inquiry of discourse" (p. 66). Three aspects of disciplines described by King and Brownell are

“communities of scholars or artists, modes of discourse, and structures of concepts” (p. 68).

The term “structure of the discipline” was first used regarding reforms in mathematics and science education, which were underway in 1959 (Soucy, 1990). Members of the scientific community were in a position to recommend changes in curriculum content and organization because scientists served as consultants on curriculum development projects. A hierarchy evolved which elevated some studies to the status of “disciplines,” while others became known merely as “subjects.” It was in this environment that art education struggled to become a discipline, justifying its existence through its interrelationships with other curriculums.

Support of the arts became a matter of public concern during the Kennedy presidency. August Heckscher, serving as a special consultant on the arts for the White House, prepared a report entitled The Arts and National Government. In 1964 the Panel on Educational Research and Development of the President’s Science Advisory Committee expressed concern with the lack of balance in federal assistance to the arts as compared to science (Efland, 1990b). It was during this time that curriculum reform was first applied to art education; that art was a discipline in its own right, with goals that should be stated in terms of their power to help students engage independently in disciplined inquiry in art. However, it continued to be difficult to find a structural equivalent of the knowledge forms of science as a basis for art curriculum.

For establishing a parallel between artist and scientist, the notion of artistic process as qualitative problem solving has been used. Eventually it was argued that artistic activity equated to scientific inquiry. It was argued that studio activity was a mode

of inquiry, but that art history and art criticism were modes as well, which gave rise to a three-part conception of art curriculum content (Siegesmund, 1998). Although Perkins, Harris and Dewey contributed to the knowledge of the value of art's contribution to education, today there is no broadly accepted argument for why art is an important area of study (Siegesmund, 1998).

History of Graphic Design Education

Graphic design, in its widest sense, has a long history. When early man hunted for food and spotted the imprint of an animal in the mud, he was looking at a graphic sign, as his mind's eye saw the animal itself (Hollis, 1994). Although graphic design has been around for 30,000 years, it has traditionally been associated with the printing industry where designers prepared text and images for printing. Although the printing industry is still a major employer of graphic designers, the term has come to mean much more (Heller, 1998). In graphic design words and images are used together to convey a visual message. In some designs the words may dominate, while in others it may be the image. Regardless of what is emphasized, the design itself, in its entirety, conveys a message.

A study published by George Ward Nichols in 1877 interpreted art education's links to industrial needs. In 1874, 1885, 1892, 1897, 1898, and 1904, Isaac Edward Clarke, an official of the U.S. Bureau of Education, wrote a number of reports on school drawing and technical training. According to Clarke, widespread art education only came about in 1870 with the passing of the Massachusetts Free Instruction in Drawing Act; Clarke had little to say about the non-industrial role of fine art (Soucy, 1990). Walter Smith, a graduate of England's South Kensington National Art Training School, also shared Clarke's bias toward drawing for industrial purposes. In the 19th century, Charles

Perkins's vision of art education as a useful form of industrial design training was challenged as perpetuating class distinctions.

In the early 1940's nearly two-thirds of American colleges and universities offered one or more art-related undergraduate courses, whether in art history, art appreciation, or basic studio (Behrens, 1995). During this same period art departments were also including design curriculum in various ways. Instruction in the elements and principles of design were thought to be important to education because they consisted of "optimum forms of the language of vision" (Behrens, 1995, p. 10).

It is now recognized that there is an important connection between drawing and design (McMullan, 1990). It has been found that drawing creates the basic structure upon which all other aesthetic decisions are made, thereby attaching the importance of drawing skills to fine art and design in addition to their already fixed place of importance in industry.

The term "graphic designer" has been historically associated with the printing industry, where designers were employed to prepare documents for printing. Hundreds of years ago medieval monks produced manuscripts by actually drawing each letter and picture by hand. For both image and text, eye-hand coordination and the skill of the artist were paramount, and the contact of pen or brush to parchment defined the entire process (Spalter, 1999).

The term "graphic design" currently reaches far beyond its association with the printing industry. "Visual communication" and "communication design", in fact, are gradually replacing the term. Although designers continue to work in the print industry, they also work in film, and new digital technologies. Graphic design educators continue

to train designers in the traditional format of solving communication problems, but they are also incorporating education in multiple media along with communication, business and science (McCarron, 2000).

Standards in Art Education

Although this study does not specifically address standards, it is important to note the role of standards in art education, particularly as they apply to the integration of technology in the art curriculum. Standards that address technology integration provide a framework for implementing technology in both teaching and learning. Standards for art education have come to be viewed as an important basis for reform that could lead to upgrading the status of the subject (Lewis, 2000).

Standards for what all students should know and be able to do have become a hallmark of educational reform that spans knowledge of academic subject areas, general workforce preparation competencies, and more specific industry and occupational qualifications (Holmes & Rahn, 1998). The accountability movement, sometimes called standards driven reform, is a technical solution to the complex problem of improving schools. This problem is even more complex when applied to art education (Eisner, 2001). Since the introduction of reform a wide range of organizations and all states except one have introduced standards for students.

The general categories for standards are: content standards that establish what should be learned in various subject areas; performance standards that define the levels of learning that will be considered satisfactory; and opportunity to learn standards which are intended to address problems of conditions and resources in order to give all students an equal chance to meet performance standards. World standards are referenced to

curriculum content and the expectations for student performance in other countries. Much of the standards discussion, both generally and specifically in art education, is about defining higher learning standards than are evident in the commercial marketplace (Greer, 1997).

One driving force behind the push for higher standards is related to what educators have learned about children's cognitive growth. The national standards movement has been concentrated in several categories, and cutting through all of these categories is a general focus on higher-level thinking skills. Critical thinking and creative problem solving are emphasized; these attributes are highly valued in all segments of the world of work.

Psychologists generally conceive of problem solving as a flexible set of mental activities. The notion that the characteristic of creativity involves problem solving is generally accepted by most psychologically oriented researchers of creativity (Gardner, 1993). Students, teachers and artists who bring increased creativity to problem solving tend to spend a greater amount of time familiarizing themselves with the problem in the context where it occurs. Sternberg and Lubart (1995) claimed that developing creativity involves "teaching individuals how to use six resources: intelligence, knowledge, intellectual style, personality, motivation and environmental context" (p. 83).

Discipline-Based Art Education (DBAE)

Educational reform in the arts has caused a major shift in theory and practice, and this change in theory has been built on the work of many scholars (Greer, 1997). The contributing antecedents to discipline-based art education are described in some detail in a book edited by Ralph A. Smith, Discipline-Based Art Education: Origins, Meaning, and

Development (1989). Discipline-Based Art Education (DBAE) focuses on the dynamic nature of aesthetics, art criticism, art history, and art production, including concepts, methods of inquiry, and communities of scholars. Discipline-Based Art Education places art as a basic component of general education.

DBAE is a comprehensive approach to improving arts education, and has become the cornerstone of efforts by the Getty Institute for the Arts, a program of the J. Paul Getty Trust, to transform the way students create and understand art (Wilson, 1997). According to Clark (1996), the fundamental premise of DBAE is that general education, to be balanced and complete, must attend to all major domains of learning, including the aesthetic. Art as a basic derives its content from the four art disciplines for the development of an enlightened citizenry, and as a basis for the advanced, professional study of art (Greer, 1997).

DBAE promotes higher level thinking skills, original problem solving skills, cultural and global awareness, verbal and non-verbal communication, and other skills that will help students through their lives. These goals are accomplished by teaching art history, criticism and aesthetics, as well as production.

In the DBAE philosophy art is an integral part of a well-rounded general education, not just for those who “do art.” DBAE recognizes that there is an important place for art curriculum specialists, teachers, and administrators in the development of appropriate curricula. Although the comprehensive approach of DBAE appears thorough, its primary focus is on fine art, theater, music and dance education, with no mention of applied arts or communication arts.

National Board for Professional Teaching Standards (NBPTS)

The National Board for Professional Teaching Standards has proposed specific levels of accomplishment defining what an art teacher should know and be able to do. The mission of this board, formed in 1987, is to define rigorous standards for teaching in all subjects, and the board has developed a nationwide voluntary system of assessment and certification of teachers for professional teaching excellence (What makes a teacher great?, 1993-94).

With encouragement and support of the Getty Education Institute, the NBPTS chose the visual arts for grades 7-12 as one of the initial subjects to be considered. A committee of middle and high school art teachers, along with other art educators, developed eight advanced professional standards for art teaching excellence.

National Art Education Association (NAEA)

The purpose of the National Art Education Association (NAEA), founded in 1947, is to promote art education through professional development, service, advancement of knowledge, and leadership. The Association promotes quality instruction in visual arts education conducted by certified teachers of art. This association also encourages art education research and publication, and sponsors institutes and conferences.

The NAEA Standards for Art Teacher Preparation focus on the essential role of the teacher for improving student learning and for implementing school reform. The first guidelines for art teacher preparation programs were formulated by a committee of the National Art Education Association (NAEA) in 1970 and revised and distributed as standards in 1979 (PBS TeacherSource, 1999). The original standards have been

reexamined, and a new document has been published in the context of current research and practice. The current NAEA standards are aligned with and inclusive of NASAD (National Association of Schools of Art and Design), NCATE (National Council for the Accreditation of Teacher Education), NBPTS (National Board of Professional Teaching Standards), and INTASC (Interstate New Teacher Assessment and Support Consortium). The standards represent consensus regarding what all beginning teachers should know and be able to do.

Because the NAEA standards are aligned and inclusive with the major accreditation and teacher licensure agencies, they provide a valuable resource for states desiring to adopt licensure and certification requirements for art educators that include high levels of accomplishment in the visual arts teacher preparation content area, as well as in continuing professional development. The NAEA standards also serve as a resource aimed at ensuring that all communities have art teachers with the knowledge and skills they need to teach so that all children can learn (NAEAnews, 2001).

National Association of Schools of Art and Design (NASAD)

The National Association of Schools of Art and Design was established in 1944 to improve educational practices and maintain high professional standards in art and design education. NASAD is the accreditation agency for education programs in art and design. This includes the establishment of curricular standards and guidelines for specific degrees and credentials. The NASAD is recognized by the United States Department of Education as the agency responsible for the accreditation of all art and design curricula.

The focus of the work of the NASAD is on issues of art and design content and educational substance as applied to the preparation of art and design professionals. Since

art and design are professions requiring talent, knowledge, skill and dedication. employment depends almost entirely on demonstrated competence. According to the NASAD, the primary purpose of schools of art and design is to help individual students turn talent, inspiration, creativity and dedication into significant potential for service to the development of art and design culture in its multiple dimensions (NASAD, 1996).

International Society for Technology in Education (ISTE)

The International Society for Technology in Education (ISTE) is the largest international teacher-based, nonprofit organization in educational technology. The ISTE is the professional education organization responsible for recommending guidelines for accreditation to the National Council for Accreditation of Teacher Education (NCATE) for programs in educational computing and technology teacher preparation. To address the evolving expectations for new teachers to be able to use technology in their classrooms, ISTE developed technology standards (NETS) for teacher preparation (Vessel, 2000).

National Educational Technology Standards (NETS) for Teachers

The National Educational Technology Standards for Teachers (NETS*T) has established basic technology competency standards for entry-level educators. The National Educational Technology Standards for Teachers focus on preservice teacher education. They define the fundamental concepts, knowledge, skills, and attitudes for applying technology in educational settings. These standards describe the aspects of technology that teachers should know about and be able to use upon entering the classroom, and were developed by national writing teams of teachers using the responses of curriculum and education groups across the nation. Six standards areas, each with

performance indicators, are designed to be general enough to be customized to fit state, university, or district guidelines. The NETS*T Standards have provided a framework for implementing technology in teaching and learning that have been widely used in universities, state departments of education, and school districts across the nation.

First-year teachers cannot be expected to put into practice what they have learned about how to use technology without the presence of essential conditions in their job environments. These conditions include the combination of traditional and new approaches to facilitate learning of relevant content, with basic support of and facilitation for the use of technology as an integral part of the teaching and learning process.

National Council for Accreditation of Teacher Education (NCATE)

The National Council for Accreditation of Teacher Education (NCATE) is the official body recognized by the U.S. Department of Education for accrediting teacher preparation programs (Leibbrand & Whitehead, 2000). There are 1,300 schools of education in the United States. About 500 of these schools are NCATE-accredited, and these 500 prepare about two-thirds of the nation's teachers (Weiss, 1999). NCATE standards hold teacher preparation programs accountable for graduates who know their subject matter and are able to teach it effectively. Candidate performance is thoroughly assessed before graduation.

In May 1994, the National Council for Accreditation of Teacher Education (NCATE) approved guidelines to further strengthen the support for technology integration into professional teacher preparation programs. The changes, which were implemented in the fall of 1995, included content studies for initial teacher preparation,

pedagogical studies for initial teacher preparation, qualified higher education faculty, and access to electronic information education-related resources (NCATE, 1995).

According to Wise (1997), President of the National Council for Accreditation of Teacher Education (NCATE), the two million teachers who will be hired over the next decade must be comfortable and skilled in using technology. Although some schools are aggressively introducing technology into teacher preparation programs, most have not yet fully integrated technology for pre-service teachers. Wise suggests that schools pay attention to the National Standards for Technology in Teacher Preparation developed by the ISTE, which recommend that all teachers acquire competencies in basic computer/technology operations, in personal and professional uses of technology, and in the application of technology for instruction. “Classroom teachers are the key for effectively integrating technology to improve teaching and learning” (Wise, 2000, p. 1).

According to the Task Force on Technology and Teacher Education, the NCATE is potentially one of the most important agents in ensuring that new teacher graduates know how to use educational technology effectively. The ability to employ technology to improve student learning has become increasingly central to the role of the new professional teacher. An NCATE Task Force made recommendations in three major areas: (a) NCATE’s leadership role in stimulating more effective use of technology in teacher education programs, (b) using technology to improve the existing accreditation process and to reconceptualize accreditation for the 21st century, and (c) improving NCATE’s internal operations through greater and more effective uses of technology (Wise, 1997).

Performance-Based Standards for Colorado Teachers

The Performance-Based Standards for Colorado Teachers were developed to meet the requirements of Senate Bill 99-154, mandating that all teacher preparation programs be performance-based. This document identifies eight standards for the licensing of all teacher education candidates in Colorado, and reflects the knowledge and skills required of beginning teachers.

Colorado Model Content Standards for Visual Arts

In 1997 Colorado adopted art content standards developed by a statewide task force. These standards are not curriculum, but statements about the academic content each student is expected to learn; they describe what students should know and be able to do. This document describes the following five standards for visual arts education in Colorado:

1. Students recognize and use the visual arts as a form of communication.
2. Students know and apply elements of art, principles of design, and sensory and expressive features of visual arts.
3. Students know and apply visual arts materials, tools, techniques, and processes.
4. Students relate the visual arts to various historical and cultural traditions.
5. Students analyze and evaluate the characteristics, merits, and meaning of works of art.

Teacher Training

Over two million new teachers will be hired throughout the next decade. A report by the American Council on Education (1999) claims past findings, combined with new research, leads to two clear conclusions. First, teachers exert a powerful influence on the academic performance of students, and second, some teachers are more effective than

others. Teachers are expected to be knowledgeable about what they teach, and proficient in how they teach it. Command of subject matter, high overall academic performance, and sound professional knowledge are three essential competencies of effective teachers (American Council on Education, 1999). Darling-Hammond (1998) noted, "...in an increasingly complex society teachers need to understand subject matter deeply and flexibly, as well as know curriculum resources and technologies to connect students with sources of information" (p. 6).

There are numerous educational standards related to technology integration and these standards are primarily directed toward general teacher knowledge about using technology to support instruction and enhance student learning. Although the capability to use technology is integral for teaching graphic design, the general ability to use, manage and understand technology is different from the specific technology common in the graphic design industry.

Fine Art Teachers

Reflective teachers acknowledge the problematic nature of teaching and systematically reflect upon their practice in order to improve it. In so doing they simultaneously engage in teaching and learning, a relationship that echoes the quality of creative activity in art and design. A study by Grauer (1998) asserts that teacher education in art should be more than training in specific skills and knowledge. Although the content of art education programs and courses is planned to introduce prospective teachers to a variety of art processes, to pedagogical issues, and to an understanding of what constitutes artistic learning, it is also expected to highlight attitudes and beliefs about the values of art education.

Graphic Design Teachers

Generally, faculty assigned to teach graphic design must hold degrees with majors in graphic or visual communication design. The terminal degree in the field is Master of Fine Arts, or a title representing an equivalent 60-semester hour degree program in graphic design. Titles of the specialization include graphic design, visual design, visual communications, communication design, communication arts, or commercial art. The term “graphic arts” may refer to technical support areas such as printing or electronic pre-press and not to comprehensive problem solving competence as detailed in the NASAD standards for majors in graphic design. Full time teachers of graphic design must be able to teach such subjects as typography, computer-assisted layout, communication and design theory, design history, design methods, multimedia and motion graphics, website design, production, and design management, in addition to fundamentals such as drawing, basic design, and color theory.

The education required for an effective teacher of graphic design in a high school fine arts program demands a level of training in the use of technology relevant to this field. The technology training most students of teaching receive is perhaps a single computer graphics course during their teacher preparation program, or a brief workshop or two they might have the opportunity to attend as part of an in-service training (Kearsley, 1998).

Students pursuing specialized training with the intent of teaching graphic design may find some confusion about the distinction between graphic design as a vocational course of study, and graphic design as a specialization within a fine arts curriculum. Certainly the vocational program is more likely to include a higher level of technology

integration, while fine art teacher preparation programs focus more on studio arts and art history. It is possible that a teacher in an art department could include graphic design in the curriculum at the secondary level, but it is not likely if the teacher did not study that content area in pre-service training.

The American Institute of Graphic Arts (AIGA) and the National Association of Schools of Art and Design (NASAD) are concerned about the assessment of graphic design faculty qualifications and issues that relate to graphic design faculty effectiveness (AIGA/NASAD briefing paper retrieved from the World Wide Web). The increased number of graphic design programs offered in a wide variety of educational settings, as well as continually increasing student enrollments, has created a great demand for qualified graphic design teachers. The strong economy, particularly in Internet related industries, favors that designers engage in professional practice rather than teaching.

The Education of a Graphic Designer

People who call themselves graphic designers come from a wide variety of backgrounds and educational experiences. While some designers are self-taught, others have attained the degree of Bachelor of Fine Arts (BFA) or Master of Fine Arts (MFA) with (or without) a graphic design specialization. Some schools differentiate the relationship between graphic design and fine arts according to topics. For example, the Corcoran College of Art and Design in Washington DC explains graphic design with a historical emphasis on writing, type, and printing; stressing the relationship between graphic design, furniture and industrial design. On the other hand, they correlate decorative arts in the context of fine arts, architecture, history, and the culture of the Western world with emphasis on theoretical and technological influences. Parsons

School of Design in New York delineates graphic design and fine art by referring to the subjects as “design and technology” and “decorative arts” respectively (Parsons, 2001).

The AIGA (American Institute of Graphic Arts) lists 240 four-year college programs in graphic design and 1,300 to 2,500 two-year programs in graphic design (Heller & Fernandes, 1999). Regardless of where a graphic designer receives training (if any) they may be called “graphic designers” as there is not a license or official certification required to work in this field. The American Institute of Graphic Arts (AIGA) has prepared a series of briefing papers to help students, faculty, educational administrators and employers to plan for the improvement of current graphic design programs, as well as assess the need for and plan new programs (<http://www.aiga.com>).

The study of graphic design can be found in a variety of training and educational and settings. Private training centers, vocational schools, community colleges, four-year art schools, as well as university fine art programs with a specialization in graphic design offer a variety of degrees and certificates. Certificates, Associate of Applied Science degrees, and Bachelor of Fine Arts and Master of Fine Arts degrees are available for students completing graphic design education programs. Degrees and certification are also available through Internet training programs for graphic design distance learners.

The time to introduce students to the field of graphic design is during high school, and the logical place to do it is in high school art programs. Although it is certainly possible that graphic designers may come from other fields of interest, art programs are the ideal place to introduce the content. Artistic talent and creativity are important in all the art and design occupations, as people in this field need strong color sense, an eye for detail, a sense of balance and proportion, and sensitivity to beauty. Although the

importance of art and design education cannot be overemphasized, it is the addition of specialized technology training that helps young people gain entry level positions in the many career areas of the visual communications industry (Wilson, Cole & Milnes, 1997).

It is important to present information about graphic design and related careers to high school art students. This ensures that when art students advance to college they have a broad knowledge base to make decisions about further studies and areas of specialization in university programs.

Although some high school art programs might devote a computer lab, sophisticated software, and specially trained teachers to introduce students to the study of graphic design, others find it financially difficult or lack faculty expertise to teach the technology component. Every high school is unique, and their art programs are frequently evolved through a teacher's personal interests and areas of specialization. Some high schools offer courses related to graphic design in departments other than art; for example newspaper and yearbook production classes, computer assisted drafting, multimedia academies, and various vocational programs.

Delivery of information about graphic design and related careers through the use of web based interactive multimedia could motivate high school students toward further studies in this field. Art students who are not familiar with graphic design and its rapid growth of related career opportunities may in fact benefit greatly from exploring the multimedia. Paolucci (1998) noted that research in the area of hypermedia technologies indicates improved learning because attention is focussed on the relationship of ideas rather than isolated facts.

In addition to the availability of the information, it is also important that high school art teachers have a basic understanding of graphic design, for with no background themselves they cannot be expected to teach the subject in their classrooms. Because many university art teacher training programs may offer a single optional course in graphic design or computer graphics, it can be assumed that a large number of students graduate and go into art teaching positions unprepared to include graphic design in their curriculums.

The Education of a Fine Artist

Tolstoy (1898) defined the activity of art as a “feeling,” which once experienced could be conveyed by means of movements, lines, colors, sounds, and images expressed in words so that others can experience the same feeling. While Tolstoy further defined art as architecture, sculpture, painting, music, and poetry in all its forms; it was his claim that the average man will define art as an activity that manifests beauty.

The importance of the arts in education has been a passionate topic in schools for many years. When budgets are tight schools tend to cut their “frills,” which have historically been art and music programs. When this happens art educators and other supporters of the arts tend to begin to justify arts learning (Davis, 1996). Much of the justification for the arts comes from the theory that art helps young students to develop skills such as disciplined attention to detail, commitment to hard work, being able to imagine solutions, and recognizing how to turn failure into success (Deasy, 1999).

Critical thinking and creative problem solving, attributes sought by employers in a wide variety of occupations, are often attributed to education in the arts. According to a report commissioned by the Association for the Advancement of Arts Education (1996),

the arts help students achieve in non-arts disciplines such as mathematics, sciences, language arts, civics, history, geography, and foreign languages.

Although many try to justify the inclusion of art in the curriculum by its perceived impact on the study of other subjects, there are also many who believe that “art for art’s sake” is of primary importance. The U.S. Department of Education, the National Assessment of Educational Progress (NAEP), the Goals 2000 Arts Education Partnership, and the Coalition for Education in the Arts all support the notion that now is a time of opportunity in the arts. The U.S. Secretary of the Department of Education, Richard W. Riley said, “The arts in all their distinct forms define, in many ways, those qualities that are at the heart of education reform in the 1990’s –creativity, perseverance, a sense of standards, and above all, a striving for excellence” (Gary & Foy, 1997, p. 13).

High School Art Curriculums

The range of potential art content is enormous; therefore, one of the greatest challenges in developing an art curriculum is that of selection. What should art teachers choose to teach? Most new art teachers come to their work with only a scant beginning toward developing their knowledge and understanding of art and art teaching.

Through the years art teachers have been encouraged to have students explore new and unusual media in their classrooms, which leads to a proliferation of projects and materials. It is not unusual in art programs to find teachers leading students through ten to fifteen projects in a single semester, each using different media. While this rapid pace does not allow a student enough time to learn to control the medium, it indicates that art teachers must carefully plan and use class time judiciously (B. Wilson, 1997).

In a studio curriculum, assessment of student learning is generally based upon completed projects. According to Short (1998), inferential evidence of this kind may not be a reliable indicator of art learning. Beginning, intermediate and advanced levels of drawing, painting, printmaking, sculpture, ceramics and jewelry often focus on principles and elements of art and skill development. The advanced levels reinforce the basic concepts through increasingly difficult studio assignments. While elementary art curriculums generally are designed to increase art understanding in all students, high school art curriculum may be intended to foster the development of professional artists (Short, 1998).

Computer Art

Although computer art is not the same as graphic design, “computer artists,” like graphic designers, use the computer extensively as a tool. Computer artists were the first to use computer technology with artistic expression to create pieces that integrated art with technology. The first radiosity image was created by Professors Moon and Spencer of MIT using applied mathematics to calculate global lighting models. This image, called “interflexion reflection” was first presented at the 1946 National Technical Conference of the Illuminating Engineering Society of North America (Masson, 1999).

Pioneering artists Stan VanderBeck, Ken Knowlton, Michael Noll and others at Bell Laboratories created computer assisted graphics using analog computer devices and output in the early 50s. Bell Fetter at Boeing in Seattle was at the same time experimenting with early vector graphic CAD using an IBM 7094 computer with punch card input and a Gerber plotter. In 1952 Ben F. Laposky used an analogic computer and a

cathode tube oscillograph for the composition of “Electronic Abstraction” (Popper, 1993).

During the 1970’s there was a hope that artists and scientists would begin to work together and that artist’s education would include information technology and programming. However, artists who were using computers in their work began to shift into two separate groups. The first group consisted of artist-programmers who used the computer to write their own programs and produce images, while the second group developed more complex approaches to programming artwork (Spalter, 1999).

Interactive graphics began making computers artistically accessible around this time, and commercial programs that had originally been developed in research labs for the military became mainstream products. Programs such as AutoCAD by Autodesk, and Apple’s MacPaint and MacDraw programs provided a new way of using computers to make art, and became far more common than the artist-programmer paradigm. Throughout the 1970’s and 1980’s computers had limited graphics capabilities, were expensive and relatively difficult to use.

For some artists the computer is a design tool, while for others it is a means of fabrication. Certain artists work with the computer because it possesses capabilities analogous to human intellectual processes, and may even be considered as a creative entity in its own right (Popper, 1993). Many of the time-consuming studies for a preliminary two-dimensional composition, normally done by hand, can be accomplished using a computer. The computer can also be used as a tool for three-dimensional design, creating digital landscapes using methods of topographical illustration.

Vera Molnar, a pioneer of computer art, asserts that computers can serve four purposes. The first purpose is to technologically expand the number of possibilities with an infinite array of colors, forms, and the development of virtual space. Second is the ability to readily satisfy the desire for artistic innovation. Third, computers encourage the mind to work in new ways, perhaps increasing time for contemplation spent between idea and realization of a piece. Finally, computers can help an artist by measuring physiological reactions of an audience (Popper, 1994).

The history of computer art took a turn after the introduction of the personal computer and interactive graphics software. Many artists followed the path laid down by the earliest computer artists, and proceeded to develop more complex approaches to programming artwork (Spalter, 1999). Social implications and impact of computer art can be measured by the large numbers of exhibitions and events that have taken place in this arena since the early 1980's.

"Computer art" in its present form has grown rapidly with the evolution of advanced technology. The convergence and combination of different technologies are being exploited by artists for their maximum efficiency in producing visually and intellectually impressive works.

As the Internet and mobile technologies began to infiltrate daily life in the mid 1990s, artists began to appropriate these tools. Unique conceptual works emerged, causing the beginnings of consideration of digital art as a new legitimate genre.

Digital art is electrons stored as intangible information on discs and hard drives. Internet art, or Net art, is a subset of digital art, and is generally defined as art created with computer code or digitized information (Berwick, 2001). Digital art, which is also

known as new-media art, tech art, and electronic art, encompasses digital video, sound art, digitally altered photographs, sculpture first sketched on a computer, and online audience participation pieces.

The Whitney Museum of American Art (<http://www.whitney.org>) included Internet art in its biennial exhibit for the first time in 2000. The Whitney Museum has launched a website designed as a portal to Internet art and the digital art worldwide. The site is intended to provide a comprehensive resource of net art and access to original art works created specifically for the site and commissioned by the Whitney (Malloy, 2001).

The use of computers by academic art historians is yet another area where technology is making considerable inroads. Although art historians have lagged far behind others in using computers for referencing and storing work, use of this evolving technology has become essential for cataloging and retrieval of art images (Hamber, Miles & Vaughn, 1989). Computers are used by art historians to collect data, retrieve data, examine issues, reconstruct, simulate and produce objects, and to communicate and produce things of beauty. Although computers in art history were at first primarily used by museums and galleries, academic art historians are also benefiting from this evolving technology.

Graphic Art

Computer graphics was first created as a visualization tool for scientists in university and government research centers in the 1950s, 60s and 70s at places such as Bell Labs, Ohio State University, University of Utah, Cornell, North Carolina and the New York Institute of Technology. Although modern graphic art or design makes use of computers as a tool for their work, graphic design did not develop as a result of this

technology. According to McCoy (1998), graphic art was a spontaneous response to the communication needs of the industrial revolution, used to sell the results of mass production in growing consumer societies. Today, visual communication design and the design of industrial products are undergoing a profound transformation as new technologies continually challenge the way images and things are produced (Margolin, 1998). The work of artists and designers now overlaps considerably with the work of other specialists in the field of communications.

Graphic designers produce artwork that is not accomplished solely for the purpose of beauty or expression of the inner self. The artwork created by graphic designers is developed to serve the purpose of communication and is often used for direct or indirect marketing. This means, generally speaking, that graphic art combines images with text to convey information. Graphic design can explain a concept, identify a company, change an opinion, or persuade a shopper to buy (Neumeier, 1997).

Drawing ability is important for designers, as the ideas, preparatory sketches, and plans are graphically realized. The process of design is exacting, and requires precision and responsibility on the part of the designer.

According to Rotzler (1983), advertising graphics is perhaps the most important medium of the profession. The beginnings of true advertising graphics in the 19th century were modest, and graphic advertising artists were not expected to produce their own independent creative work. However, advertising rapidly became the means for artistic and stylistic trends to reach the public, making them familiar with new directions in art although many had never visited a studio, gallery or exhibition,

The role of artists and designers in the “information age” is as “information agents;” they transport ideas, concepts and opinions. The computer has become the epitome of the information age, as any input is considered information. Artwork, photo or video, image or text or sound, whether moving or still, can all be translated into bytes and pieces, thereby escalating the computer to the status of a very important tool in the creative process.

The designer is an expert who solves the visual-spatial, product, and visual-communication problems for a wide variety of clients (Curtiss, 1987). Because graphic designers are client oriented, they need to have good verbal, social and interpersonal skills. They have a responsibility to their own ideals, the client’s needs, and also for common social and environmental concerns.

Technology Integration

According to Wilson and Talley (1991), technology integration means at least three things: (a) embeddedness in a curriculum, (b) continuity with the prevailing pedagogy, and (c) physical and temporal accessibility. The use of computers in education has increased dramatically in recent years. At the same time as schools have come to the realization that professional development for teachers is an important investment, the advent of technology in every classroom has pressured educators to learn to use the computer as a teaching tool. As schools of education and educational agencies move to develop a profession of teaching for the future, it is important that educators become prepared to teach in new ways in the “digital age” (Lucas, 1999).

Students cannot fully experience the benefits of technology for learning unless their teachers are sufficiently confident and capable to model its use. Although standards

exist for teacher technology competency, many teachers lack the familiarity, the time to learn, the required technical support, or even the basic materials to begin incorporating these new ways of teaching and learning into the daily classroom. Even those teachers who are computer literate need a vision of technology in the learning process. (Collier, 2001).

According to Gura (2000) schools tend to fall into two categories in relation to technology. The first group is already integrating technology into teaching and learning, while the second group is in a “holding pattern.” waiting for something undefined to signal the beginning of the computer-supported learning era. Gura claims that most schools fall into the second group. although no particular technology resource holds them back. These schools already have computers, networks, online access, and professional development, but do not have genuine commitment to a meaningful adoption of instructional technology.

As educators increasingly seek resources for curriculum development, classroom instruction, and professional development on the Internet, they need help organizing and presenting these materials in order to use them effectively. Much attention has been paid to wiring schools, but less thought has been given about how to help teachers make effective use of technology resources. Teachers need adequate generalized training in how to use technology, and they also must be instructed in the use of specific applications. Teachers need support from department heads, administrators and district personnel to plan and schedule lessons and review materials that will help them develop and implement successful uses of computer technology (Honey & Moeller, 1990).

Shearman (1997) found time to be a major factor that must be considered when preparing schools for successful technology integration. Without adequate time, it is not possible to resolve the personal, technical and pedagogical challenges that arise. Teachers frequently feel frustrated by their lack of computer skills, and then further frustrated by a lack of time during school hours to develop those skills.

The Getty Information Institute and the Getty Education Institute for the Arts are two important resources for art educators seeking to utilize web information (Bower, 1998). These Institutes work with organizations around the world to make information about the arts and culture available online for education. The Getty Institutes make extensive use of the Internet's interactive potential to create online communities for those interested in arts and humanities education. The Getty "ArtsEdNet" provides a wealth of information for art educators (<http://www.artsednet.getty.edu/ArtsEdNet>).

Some teachers believe that the Internet will become an indispensable tool in art education. However, according to Honey and Moeller (1990) the lack of adequate examples concerning the use of computers in specific disciplines makes it difficult for many teachers to envision the relationship between technology and education. Various art teachers across the nation have set up web sites to help other teachers understand how to use the Internet in art education, as well as computers in teaching art. Increasing numbers of art educators believe that curriculum should include teaching graphic design, along with traditional drawing and painting, and that students should learn to use the computer as an art tool (Bower, 1998).

In a ten-year period computer technology changed significantly, making it difficult for faculty members to maintain computer literacy (Barnes, 1996). Some

educators fear that computer technology will require continuous learning of additional skills to become literate, and as a result, a huge gap will be created between people who are “techno-literate” and “techno-illiterate.” In spite of widespread advertising campaigns that describe computers as user-friendly, computer users, including educators, continually need to update their skills.

When past-President Bill Clinton embraced the goal of computers in every classroom as a bridge to the twenty-first century, he committed between \$40 and \$100 billion over a five-year period for technology in schools (Oppenheimer, 1997). Although there is evidence both in favor of and against increased technology integration in schools, Oppenheimer suggested that the Clinton Administration was narrowly focused on the favorable side of the issue, charging that the Administration’s task force was made up of primarily technology advocates; two thirds of which work in the high-tech and entertainment industries.

In addition to gaining technology skills, educators are also faced with the task of attempting to evaluate outcomes of the growing use of computers in classrooms. The Educational Technology Expert Panel, empowered by federal legislation and working under the auspices of the U.S. Department of Education, is an 18-member group charged with identifying and recommending to the Secretary of Education “promising and exemplary educational technology programs to improve the quality of student learning” (Simkins, 1999, p. 37). By law, the panel must base its recommendations on four criteria: evidence of success, quality of program, educational significance and replicability. Although this appears to be a logical process, educators have continued to debate what constitutes good evidence, and how to define improved student outcomes.

Regardless of what practicing educators feel about technology in their classrooms, it has become apparent that there is a need to prepare pre-service teachers so they can use technology as an integral part of teaching (Carbonaro, 1997). According to Oblinger and Verville, 1999), computing and communications technologies have changed the way we work and created the major industry of our times. The major trends behind these changes, i.e. digitization, storage, processing power and universal communication, have created a networking revolution. Higher education must be ready to play a major role in the networked world, both in developing the capabilities, as well as training and educating those who use them. This in turn will create new job opportunities, especially for individuals who have strong problem-solving skills.

Multimedia in Education

Multimedia technology is commonly understood to be all the “cool stuff” used to create the desktop equivalent of glitzy television (Ohler, 1996). While interactive television, video-on-demand, and other attempts to convert old media into new services have diminished, the Internet has grown with tremendous speed, bringing with it the opportunity for full interactive multimedia potential. Multimedia offers the opportunity to reason, think, speculate, debate and learn in more concrete, multi-sensory terms than the abstract form of written or mathematical expression (Barnes, 1996). One of the benefits of multimedia is that it can be projected or displayed on computer screens to act as an audio-visual teaching aid. However, some critics argue that multimedia is creating a decline in literacy, as computers discount words in favor of pictures, and pictures in favor of video.

The term multimedia is understood differently by different people, and is used interchangeably with such terms as “new media,” “hypermedia,” “integrated media,” or more often “interactive multimedia.” Although these terms are often used interchangeably, the concept is the same. This concept involves the merging of formerly separate media in a manner that allows associations or links between the various elements (Ebersole, 1997).

There are seven basic elements used in multimedia: text, graphics, photographs, sound, animation, video and interactivity (Graystone Multimedia Design Group, 1996). Traditionally, text has been used to convey messages, but the advent of multimedia has provided an opportunity to convey messages more graphically and rapidly than text.

Interactive media are different from more familiar media in the degree of contact between the use of the medium and the mechanism that delivers the content. This is known as the “user interface,” where two different worlds meet (Ebersole, 1997). The graphical user interface (GUI) originated at the Xerox Palo Alto Research Laboratory in the late 1970’s. Xerox’s Star workstation, introduced in 1981, was the first commercial implementation of the GUI and served as the inspiration for the Macintosh computer and other future GUIs.

A GUI (usually pronounced Goo-ee) is a graphical rather than purely textual user interface of a computer. The term came into existence because the first interactive user interfaces of computers were not graphical; they were text and keyboard oriented and usually consisted of commands that had to be remembered and computer responses that were brief. The study of user interface is known by several terms, e.g., human-computer interaction (HCI), human factors, and ergonomics (Ebersole, 1997).

Although early systems interfaces were designed by and for engineers, the focus eventually began to shift from the technology as the driving influence, to the user and the user's experience in interacting with a system (McCarron, 2000). In 1984 the Apple Macintosh erased the boundaries between digital text and graphics by introducing graphical interfaces and desktop publishing programs. In the next ten years, the Macintosh was transformed from a small black and white print oriented computer into a multimedia powerhouse (Barnes, 1996).

Users of computer based interactive media are constantly clicking a mouse or keyboard, selecting icons, opening windows, and otherwise interacting with the hardware and software interface. Compared to traditional media, computer-based delivery technologies requires an active consumer. This required activity could be detrimental to inexperienced users. Dealing with an unfamiliar user interface while trying to remember a "position" within the document can put a load on the cognitive process, thus making less processing power available for comprehension and learning (Ebersole, 1997).

Early research related to educational technology established a body of evidence suggesting that technology could have a positive impact on several dimensions of students' educational experiences. Hundreds of studies told educators that specific kinds of technology applications could improve students' scores on tests of discrete information and skills. However, the studies were not able to tell educators much about the larger challenge of using technology to help students develop capacities to think creatively and critically (McMillan, Hawkins & Honey, 1999).

It has become necessary to determine whether the use of technology, especially the use of interactive multimedia, is a more effective way to teach and learn than

traditional teacher centered instruction. A meta-analyses by Kulik and Kulik (1991) suggested that computer-based instructional materials had a positive effect on student performance. With the rapid advancement of technology, research efforts attempt to explore impacts of design, learning, school culture and practices, along with other factors that shape the impact that technologies have on schools (McMillan, Hawkins & Honey, 1999).

As education moved toward the rapid integration of technology across the curriculum, it was not clear whether students would retain information received via computer better than information received from a traditional lecture. A major domain of current research in educational technology is on tool design and learning. A study conducted by Crain (1994) found that computer assisted instruction and traditional lecture formats have better success with immediate recall of information than video instruction. Mayer (2001) conducted studies to compare retention and transfer performance of students who received instruction by text only, and text with illustrations. It was found that students perform better on verbal retention when they learn with text and illustration or narration and animation than when they learn with text alone or narration alone. It was also found that adding pictures to words improved students' understanding of an explanation.

Tool design usually begins with a set of teaching and learning questions, followed by researchers and developers working together to design specific tools or pieces of software that can be effectively integrated into the classroom to improve student learning around specific tasks. Adequate technical expertise and sufficient time is required for tool design, but tools can be developed that help teachers and students achieve a range of

work that they could not otherwise do in the classroom (McMillan, Hawkins & Honey, 1999).

Fair Use Guidelines for Educational Multimedia

Under the Copyright Act of 1976, copyright owners have “the exclusive right to reproduce, prepare derivative works, distribute, perform, display, transfer ownership, rent or lend their creations.” Under the same Act, the “fair use” exemption places a limit on these exclusive rights to promote free speech, learning, scholarly research and open discussion. Many technological developments have occurred since 1976, and the Consortium of College and University Media Centers (CCUMC) has drafted guidelines to provide guidance on the application of the fair use exemption by educators, scholars and students in creating multimedia projects that include portions of copyrighted works for their use in noncommercial educational activities (Educational Multimedia Fair Use Guidelines Development Committee, 1996). Although the guidelines do not represent a legal document nor are they legally binding, they do represent an agreed upon interpretation of the fair use provisions of the Copyright Act.

While only the courts can decide whether a particular use of a copyrighted work falls within the fair use exemption, these guidelines represent the participants’ consensus view of what constitutes the fair use of a portion of work that is included in a multimedia educational project. The specific portion and time limitation guidelines help educators identify whether using a portion of a certain copyrighted work in a multimedia program constitutes fair use of that work.

Multimedia works including CD-ROMs, music, graphics, illustrations, photographs and software are all protected by copyright law. The Internet has also been

added to this group, and information from the web cannot be copied and distributed without permission (Allen, 1999).

Fine Art Occupations

Approximately 11,000 students receive bachelor or master's degrees in fine arts every year in the United States (Grant, 1998). Data from the Bureau of Labor Statistics show that more than 2 million people were employed in primary jobs as artists in 1999, and an additional 298,000 people held secondary jobs in artist occupations (National Endowment for the Arts Research Division, 2000a). The NEA Research Report *Artists in the Workplace* summarizes answers to the basic questions about where artists live and work, and what they earn. It is stated in the report that an "underlying assumption throughout the report is that the intrinsic rewards for artists in doing the work they most want to do cannot be quantified."

The authors of the NEA report used data from the U.S. Census, along with various surveys of artists and industry records. It was found that painters and craft artists were the second largest of all artist occupations. According to the Census, the education level for this group was 4-plus years of college, with over 40 percent of the painters/craft artists having graduate degrees.

Many artists are self-employed, a fact that causes difficulty in precise reporting of work and income levels. In addition, a large percentage of artists hold two jobs and switch among multiple short-term jobs, further complicating the issue. According to the National Endowment for the Arts Research Division Executive Summary (2000c), artists moonlight more frequently than all workers in the labor force, and more frequently than other professional workers.

Past-President Lyndon B. Johnson signed the National Foundation on the Arts and Humanities Act that brought into existence the National Endowment for the Arts and the National Endowment for the Humanities in 1965. At the signing ceremony Johnson said “Art is a nation’s most precious heritage, for it is in our works of art that we reveal to ourselves, and to others, the inner vision which guides us as a nation.....We in America have not always been kind to artists and scholars who are the creators and keepers of our vision. Somehow, the scientists always seem to get the penthouse, while the arts and the humanities get the basement” (Brenson, 2001, p. 1-2).

Although income levels for artists vary dramatically, overall females earned less than males in all sectors between 1970 and 1990 (National Endowment for the Arts Research Division. (2000b). The NEA reported that the median income for female painters/craft artists between 1980 and 1990 was \$23,113. Hall (1996) claims that the artists who survive in art occupations are not necessarily those who are most talented, but rather those who have the belief to sustain them that what they are doing is worthwhile, a sense of professional discipline, and some luck. According to Brenson (2001), recent studies have found that most artists in this country exist slightly above the poverty line. Don Bain, Chairman of the Colorado Council on the Arts, states that 50 percent of Colorado artists earn less than \$25,000 per year. (Artsday Legislative, 2000).

Graphic Design Occupations

Of eleven individual artist occupations noted by the Bureau of Labor Statistics in 1999, the “designers” occupation was the largest of the categories. In 1999, 722,000 workers were employed as designers. According to the American Institute of Graphic Arts (AIGA), annual salaries for graphic designers range from \$16,000 for a junior

designer to \$32,000-\$60,500 for an art director, to \$124,000 and upwards for a creative director (Heller & Fernandes, 1999). Further, each design specialization has its own salary range, which can vary greatly.

Over the years art and design education have not fared well as eroding budgets and teacher shortages have prompted elimination of art programs across the nation. Students not exposed to the arts in elementary and high school are not likely to pursue higher education in the arts. In addition, the recent emphasis on aligning education with career goals may discourage some talented students who may be unaware of the variety of creative and interesting careers available in the field of visual communications.

Students who study post secondary graphic design will become a pool of highly skilled artists and designers needed to work in advertising, publication design, and corporate design, as well as multiple other industries that require a constant infusion of new talent to survive (Hershfield, 1993). Industries that rely on a design-related workforce would benefit from increased opportunities in art and design education. Also, creative kids are missing opportunities to experience fulfilling and exciting careers when schools fail to recognize and nurture their talent.

The multimedia teaching tool developed for this study (Appendix E) provides an overview of fifteen occupations that are related to the field of graphic design, and all require at least some graphic design education or training. The multimedia contains Internet links to jobs that are currently available in the industry for many of the categories.

Advertising

There is no larger mass communications producer than the advertising industry. More than any other discipline, advertising is completely intertwined with American life. As a persuasive communication, advertising is an integral part of commerce, intended to convince people to buy things. Advertising also informs people about products, services, events and causes.

When advertising became a viable industry in America at the turn of the century, commercial artists including illustrators, boardmen, and letterers were in great demand (Heller, 1998). The number of employees in an advertising agency is directly proportional to the number of clients that it services as well as the number of accounts that it is attempting to gain. Although the largest amount of staff work is devoted to existing accounts, some staff is usually devoted to attracting new business.

An agency, regardless of size, may spend hundreds of thousands of dollars to capture a prized multimillion-dollar account (Heller & Fernandes, 1999). Some of the best talent in the field of communications works in advertising. In an agency the account executive, who usually has a background in marketing and advertising, is the liaison between the agency and the client (Craig, 1983). There are also creative directors, art directors, and copywriters, along with a variety of assistants and production personnel, depending on the size of an agency.

Animation

J. S. Blackton, an American cartoonist, was probably the “father of modern animation” (Simpson, 1990). He successfully combined art with cinema to make the first animated cartoon, Humorous Phases of Funny Faces, in 1906. In 1911 Winsor McCay

produced an animated version of his newspaper comic strip Little Nemo. In 1914 McCay took the cartooning world by storm with the public release of Gertie the Trained Dinosaur, which showed the world what animation could do, both artistically and commercially.

Disney dominated the animation world in the 1930's and 1940's, winning every Academy Award for animation during those years. Disney's successes created a boom market for commercial animation, and many new studios started up in competition. Pacific Title and Art, which produced films for Warner Brothers, developed the "Bugs Bunny" character in 1939, followed by Porky Pig, Daffy Duck, Road Runner, and others. United Productions of America, and later Storyboard, both independent production companies, created innovative animation projects in the 1950's and 1960's. It was during this period that some of the first animated television commercials were produced.

An animator makes moving pictures, free of the artist's limitations of a flat, static surface. An animator must know how to draw, write, direct, design layouts, edit, animate, operate a camera, design a set, and design lighting and special effects. The animator must also understand the basic language of film from a classic point of view. Modern techniques of digital storage and computer colorization have revolutionized part of the animation process.

There was a time when there were relatively few jobs for animators outside of the major animation studios in Hollywood. Currently the demand for animation is growing as box-office success of animated feature films, animated cartoons, animated commercials, animated video games and animated web sites have created a need for both skilled creative animators as well as for more animation teachers. The complexity of the

animation process makes it a difficult subject to teach. Students need solid drawing skills, and the ability to flexibly apply their personal creativity and disciplinary understanding to solve novel problems (Page, 2001). Karen Chelini, director of human resources for LucasArts Entertainment, states “with traditional art training, you train the eye to pay attention to body movement. You learn attitude, feeling, and expression. The ones who are good are those who as kids couldn’t be without their sketchbooks” (Oppenheimer, 1997, p. 53).

Book Design

Book publishing represents one of the largest employers of graphic designers. Each year approximately 45,000 books are published (Heller & Fernandes, 1999). The book design profession is divided into the two basic categories; those being book interior and book jacket. While the design of the book itself is generally the responsibility of an in-house designer, freelance designers often design book covers. Although it is often said “you can’t judge a book by its cover,” it is a fact that the design of a book’s cover is what makes the important first impression on potential readers. A professionally designed attractive and intriguing book cover may actually encourage readers and increase sales of a particular book.

Readers are accustomed to buying and reading books that employ professional book design to emotionally communicate and support the writer’s message. A book designer is responsible for taking an edited book manuscript through the design process so it can be typeset and reproduced. The book designer must plan the use of illustrations and/or photographs in the text, the specifications of what style and size of type to use, and

the look of the book's cover. These skills require a thorough knowledge of book design principles and the printing process.

A book designer may work for a publisher, a book packager, or independently. Book designers generally have a bachelor's degree in art or design, or an art school diploma. Designers with strong computer skills and knowledge of page layout applications have good opportunities for employment. Organizations such as the American Institute of Graphic Arts and Book Publishers provide career guidance and professional support for book designers.

Corporate Design

Graphic design is one of the most powerful tools in creating a professional image for a company, therefore the greatest patrons of graphic design have traditionally been found among powerful businesspersons. A trademark can be an enormously valuable business asset. It may be the most valuable property of a corporation; more than its products, machines, and factories (Doblin, 1967).

Multinational corporations have the resources to fund interdisciplinary design and to encourage progressive architecture, industrial, interior, and graphic design. The discipline known as "CI", or corporate identity, began in the early twentieth century in Germany, where graphic designer Peter Behrens developed the earliest inclusive, coordinated design system for the leading Germany electrical company. What Behrens did that no designer previously had done prior was develop a consistent design scheme of standard typefaces, layouts, and colors, the application of which was governed by rules put forth in a design systems manual. This insured a uniform approach to design,

regardless of who was designing the individual components of the corporate communications.

In the 1950's the surge of American corporations trying to establish a public identity gave strong impetus to graphic design as a profession (Kelly, 1993). Many corporations established design departments, and some retained prestigious designers as consultants.

The graphic designer who works in the corporate world will see increased use of sophisticated printed communications. Everything from letterheads to annual reports are being produced with a greater focus on type and graphics. The corporate designer seeks to reinforce the image the corporation wishes to create with the use of appropriate visuals.

Desktop Publishing and the Printing Industry

Historically designers have relied on outside professionals such as typesetters and printers to provide the technical results of their trade. The relationship among designers, typesetters, paper companies, and printers was symbiotic and almost exclusive (Thornton, 1996). Computer technologies have changed the way the printing industry works. Most typesetters have disappeared and their duties have been absorbed by graphic designers as the publishing industry becomes increasingly digitized (Bergsland (2001).

In the State of Florida, the graphic arts industry is the largest manufacturing employer, with approximately 64,000 workers (Mukes, 1995). Three thousand six hundred firms do a total of \$7 billion in annual sales. This is inclusive of workers in design, bindery, estimators, image assemblers, typesetters, cameramen, customer representatives, and sales representatives. Mukes found that the training for many of

these jobs can be done at the two-year level, and that computer literacy is needed for all positions. Necessary computer skills range from use of a computer for layout and image editing, to file management skills. The study by Dr. Mukes also found that colleges need to teach students to use current software particular to the graphic arts industry, and should continually expose students to the latest software releases and innovations.

In 1998, the Graphic Arts Education and Research Foundation (GAERF) retained Allegiant Partners, Inc. to conduct a survey to identify ways in which GAERF might best serve the graphic communications industry. According to the survey results, the “number one challenge facing the industry is the difficulty of attracting qualified employees” (Allegiant Partners, Inc., 1998, p.1). Many of the survey respondents felt that the problem is caused by a negative perception of the industry. In January 1999, the GAERF issued a request for proposals for the development of a campaign to attract students into the industry and simultaneously to promote a positive image of the graphic communications industry.

Lewis and Konare (1993) conducted a study of labor market information needs of technical and vocational college personnel in Minnesota and Wisconsin. They found that technology was affecting jobs, and that the educational requirements of jobs were changing. The printing industry is among many industries that have been forced to deal with the impact of technological change (Lewis, 1996). In 1998 the U.S. Labor Department identified desktop publishing as the seventh fastest growing job for 1996-2006 in terms of percent. The Occupational Outlook Handbook (2002-2003) ranks desktop publishing among the 10 fastest growing occupations. Although some might associate desktop publishing primarily with typing, word-processing or secretarial work,

it is in fact a job that requires considerable basic design knowledge in addition to the skills of keyboarding with speed and accuracy, and using computer hardware and software. Because desktop publishing is an important and primary example of visual communication, top-rated desktop publishers must be able to design publications that are clear, accurate, and easy to understand. They must be able to accomplish the task with speed and accuracy, and be knowledgeable about page layout software. Desktop publishers may also be involved in the printing process, requiring a basic understanding of the printing industry, working with digital files, as well as paper and ink color selection. The foundation of this knowledge lies primarily in the arts, for designing a quality publication, which readily conveys a message to an intended audience requires that the designer know color theory, layout design, balance and harmony; all of which are important foundations for artists working in any media.

Exhibition Design

Exhibition design is a hybrid area of design activity with issues and problems spanning architectural, product, graphic and multimedia expertise. When substantial numbers of priceless artifacts are involved, security and conservation problems are added to communication, display, and traffic flow issues.

Museums interpret works of art in different ways, frequently through gallery installations which establish connections between related artworks or create a chronological or historical context on labels or other documentation (Haubenstock & Joselit, 2001). Most large museums employ exhibit designers who translate curatorial and educational ideas into gallery installations.

Collaboration is usually required in large exhibition design, for it is unlikely that a single designer, or even a single firm would have the range of experience needed to address all the issues in planning and staging exhibitions. The museum exhibit designer works closely with curators to translate their concepts, producing plans, renderings, and scale models. Great attention to detail is necessary to show configuration of walls, placement of works, pedestals, cabinets and cases, as well as appropriate lighting. The exhibit designer also decides on color schemes to maximize the display effect.

Exhibition is primarily about communication, so it is appropriate for a graphic designer to be the lead designer in exhibition design projects. In addition to working for museums, exhibition designers might work for retail businesses or trade shows. Exhibition designers must know how to make renderings and scale models, as well as how to fabricate actual exhibit components. Exhibition designers may have degrees in graphic design, industrial design, or environmental architecture.

Film and Video Design

Applications of computer graphics, particularly in the fields of animation and special effects, have developed rapidly in recent years. Hollywood feature films and television programs now routinely depend on high-technology image-processing operations for their commercial success (Scott, 1998).

In 1995 the Wall Street Journal observed a sharp rise in TV and film production, creating more jobs, revenues, and opportunities than ever before. The Honorable Delaine Eastin, California's State Superintendent of Public Instruction, recognizes the value of art education in that state, as it is the basis of numerous jobs in industries ranging from high tech to entertainment. Within the last few years, 200 multimedia businesses with 60,000

jobs have been added in Northern California alone (Regan & Associates, 1999). The entertainment industry annually creates new jobs that range from programming to lighting, set construction, and animation. The new technology of digital television is expected to produce tens of thousands of new jobs.

The multimedia industry consists of firms that produce compact disks and materials for diffusion over the worldwide web (Scott, 1998). These products include things such as games, interactive stories, educational and self-help materials, business aids, and advertising. In this sense, the multimedia industry is pushing all media into convergence around interactive, digital methods of presentation. In California, the Bay Area and Los Angeles County are emerging into a position of world dominance in the multimedia and digital visual effects industry. Although Southern California represents the country's most densely developed concentration of specialized workers in such domains as story writing, visual dramatization and scene production, many firms report an acute shortage of workers with computer graphics skills and other forms of multimedia expertise (Scott, 1998).

Illustration

The role of the professional illustrator is to accompany, explain, decorate, or to expand an idea in a visual way (Simpson, 1990). Illustration jobs come in all shapes and sizes, with all manner of deadlines.

Early illustrative styles and experimentation with traditional reproduction techniques, along with the study of historical examples, has contributed to a broad range of illustration styles. Storytelling in pictures predates language. Illustration has been a vital art form in the history of the modern world, and is an established part of the cultural

experience. Popular culture has contributed to the range of emerging visual languages, and artists in search of a personal niche have explored many forms of popular print (Simpson, 1990).

According to Payne (2001), twenty-five years ago it was not uncommon to find a number of advertising agencies and art studios providing full-time employment for illustrators. The economy in major cities like New York, Chicago, Detroit and Los Angeles provided ample work for numerous studios, while smaller communities were regionally self-sustaining, allowing them to develop pricing structure and rules of business in line with the area's cost of living. Illustrators, working full time, learned about clients, deadlines, and working with art directors and account executives.

Technology has dramatically changed the illustration industry. The use of computers for illustration began in the early 1980. At first computer images were primitive, as they were limited by available software (Wands, 2000). Rapid technology advances made digital illustration popular, and magazines like Time, National Geographic, and others used high-end computer graphic systems. The development of CD-ROM storage, allowing for type, image, sound and video to be handled in one large, interactive file, brought a new type of work for illustrators as images were needed for video games, animation and interactive programs.

Fax machines, overnight shipping, and the Internet have offered illustrators access to markets all over the country and the world. Along with the benefits of technology, new challenges have been created for illustrators. Production, delivery, promotion, copyright, contracts and licensing are all issues for modern illustrators.

Magazine Design

The design and production of a magazine is one of the most interesting and challenging areas of printed communications. Magazine art directors are among the most innovative in the media world and must be highly knowledgeable about all aspects of printed communications (Simpson, 1990). It takes the combined talent of an artist, the knowledge of a psychologist, and the skills of designers and printers to produce a magazine that will encourage readers to anticipate each issue, and to reach for one particular magazine among all the others (Conover, 1995).

The front cover is the most important page in magazine design. The cover creates the first impression, identifies the publication, and says something about its “personality.” Magazine covers are often the work of innovative illustrators. A cover illustration must be graphically bold to work visually very quickly. The illustration must operate with a logo, explain cover lines, and convey further information about the magazine. How the magazine looks on the newsstand can influence sales, especially impulse buys.

Newspaper design

Printed “news sheets” and handwritten “newsletters” were circulated in colonial America, but the newspaper did not become a mass medium until the 1830s with the emergence of the penny press (Schudson, 1973). The emergence of new national newspapers over the last decade has highlighted an area of publishing that is going through a period of radical technological change. Although financial analysts report that competition with television and on-line services are causing the newspaper industry to falter, there is in fact an increased demand for art directors, designers, graphics editors, and production personnel at newspapers (Heller & Fernandes, 1999).

Few colleges or art schools have courses specifically dedicated for newspaper design, and many designers who work in this industry come through school newspapers, internships, and junior design positions at magazines or other publications. Typical job titles for designers who work in the newspaper industry are junior designer, senior designer, and art director or graphics editor. In some papers there is a higher level position called senior art director, or managing design director. The various jobs and corresponding job titles vary from newspaper to newspaper, depending on the size and distribution of the paper.

The treatment of newspaper graphics to explain news items has been inspired by broadcast television, where the technology associated with desktop publishing was first made available to graphic designers (Cotton, 1990). Technology offers the newspaper graphic artist greater creative freedom in text and layout.

Consistency is an important consideration in newspaper design. Headlines, use of photographs, and effective illustrations contribute to the look and readability of a newspaper. Working with text editors, picture editors, and graphics editors, the newspaper designer must select elements that help tell stories, giving careful consideration to typeface selection, size of type and use of color. This intersection of news and art is a unique and interesting job for creative designers who enjoy the challenge of working in a fast-paced environment with strict deadlines.

Packaging Design

Packaging is a specialized area of the graphic design profession. A package is the culmination of marketing, advertising and merchandising (Lubliner, 1996).

The creation of packaging for products involves engineering concerns, such as types of materials, and artistic concerns, such as creating eye-catching graphics and easily recognizable logos. The package designer works on the shape, color and message of an item's package. Packaging is a three-dimensional design discipline, and the designer must give careful consideration to all surfaces throughout the design process. Package designers must be familiar with a variety of material and their qualities, such as glass, plastic, cardboard, paper and metal. Workers in this area of design must also know about manufacturing, display, recycling, package regulations and printing technologies.

Although there are many exceptions, the most popular package is a paper box, representing a six-sided sales opportunity (Coyne, 1993). Package design has a strong impact on consumers; an attractive package on display motivates a consumer to pick it up. The package is often what moves a consumer to purchase a product; a well-designed package can make an inexpensive product look expensive.

Package designers often have a degree in design, with experience in a graphic design studio. Increased government labeling requirements for consumer goods has caused this field to grow, creating new opportunities for work in the package design industry. The Packaging Design Council provides networking opportunities and job search support.

Teaching

A skillful teacher can inspire, motivate, stimulate, and develop the minds of students. Teachers of graphic design are found in a variety of educational settings, because graphic design content does not have one firm place in the educational

curriculum. These teachers may be in a fine art department, a vocational program, or a specialized area that combines academics with applied studies.

Type Design

The work of a person specializing in type can be divided into two main areas. The “type designer” specializes in the design of new typefaces, while the “typographer” uses type already in existence (Cotton, 1990). Typeface design, manufacture, and marketing have undergone profound changes in the past two decades, with millions of users of electronic publishing systems needing their own range of fonts.

Type has existed for about 550 years, with its beginnings rooted in the life of the caveman. The earliest attempts to record ideas were cave drawing, or pictographs, which were simple representations of people, places and things. Symbols representing ideas and actions were later developed. These symbols were called ideograms. This made communication more difficult, and society became separated into two groups: those who could understand the system and those who could not. At this time spoken and written language were very different from each other, requiring people to learn two unrelated systems of communication (Strizver, 2001).

As the society became more complex, the existing system did not meet increasing communication needs, leading to the development of letter symbols. These symbols represented words when put together. Around 1000 B.C. the Phoenicians developed twenty-two symbols that corresponded to the twenty-two sounds of their language. Their idea was to connect the twenty-two symbols representing written sounds to imitate spoken words. Around 800 B.C. the Greeks added vowels and named the symbols, and

later the Romans made further changes by adding more letters, bringing the writing system closer to our modern-day alphabet.

In 1448 Johannes Gutenberg, a goldsmith from Mainz, Germany, invented moveable type. This was accomplished by carving the characters of the alphabet in relief onto metal punches, which were then driven into other pieces of metal called matrices. Molten metal was then poured into these matrices, making the actual type, which was identical to the original relief punches. Gutenberg's first type design was in the style of heavy blackletter, and contained over three hundred characters. As printing became more widespread, a variety of different typesstyles emerged based on popular handwriting styles of the time.

Over the centuries, type designers were extremely influential in shaping the printed word. The invention of phototypesetting in the mid-1950s eliminated many of the restrictions of the typesetting process, and had a major effect on typography and type design. In the sixties and seventies the innovative work of Herb Lubalin, a New York designer, influenced type design around the world by using typographic forms as graphic elements in design. This was made possible by phototypesetting techniques that were not possible in the era of hot-metal typesetting.

New digital typesetting methods were developed in the 1980s, but used primarily by professional typesetters in type shops due to the expense of the electronic technology. In 1985, when Apple introduced the first affordable "desktop computer," it became possible for virtually anyone to set type on a computer.

The typographer's job is to communicate ideas and emotions. Both the typographer and the type designer must understand how people view and respond to

images portrayed by type. People who work with type must understand and be able to respond to the requirements of clients, as well as have an ability to pay attention to detail. For designers who are interested in working with type, an entry-level position at a foundry is a good start. This type of position with a foundry that both licenses other designers' and produces its own typefaces would give a designer exposure to the entire design process, from concept to distribution (Heller & Fernandes, 1999).

Video Game Design

Computer games have created an entire new industry in recent years. A game is a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in the pursuit of a goal. Over the past five years the games industry has been growing faster than any other part of the entertainment business ("Play to win," 2000). The \$7 billion a year video game industry develops approximately 2,000 new game titles annually, requiring thousands of workers with a wide variety of skills.

The importance of art and design in game design cannot be overestimated. Strong graphic design immerses the player in the game. Testing has shown that it is the art that initially draws people to games. A successful game involves a blend of hundreds of factors, including art, programming, production and psychology. Design is the place where all these things must meet to form a coherent whole, and striking this balance is the designer's task.

Web Design

Web design is a specialized function within information technology, and a key role in web development. Web designers create the look, feel, and navigation for websites by choosing the style, fonts, and other elements to make a site visually appealing. Web

design is a specialized function within information technology, and a key role in web development. Web designers do the “front end” work, which includes designing the page and user interface.

The World Wide Web is the fastest growing medium on earth. There are continuously more sites, more pages and more viewers, creating a huge demand for new designers specializing in web design. The demand comes from design firms and advertising agencies, start-ups, dot-coms, and corporations of all sizes (Schwartz, 2000).

The World Wide Web is an Internet-based global information initiative begun by Tim Berners-Lee at the European Laboratory for Particle Physics (CERN) in Geneva, Switzerland. First proposed in 1989 and released to the Internet community in 1991, the Web represents a universe of network-accessible information in hypertext and multimedia form (Hoffman & Novak, 1995).

The look of the early Internet consisted of yellow text on a black background, and codes were used to navigate through the pages. Today's Internet has color, sound, graphics, animation, video and interactivity, creating a high level of interest and accessibility. NEC Research has determined that at the end of 1999 there were 3.6 million web sites, and more than 4,000 new sites launching every day. This equates to over 1.5 billion individual pages on the Web, with that number growing by 2 million pages per day (Schwartz, 2000).

The increasing popularity of the Web as a business vehicle and advertising medium is due to its current size and future growth prospects. An October, 2000 issue of Publish magazine, stated there were 2.7 million Internet business strategists in the United States working as Net-Comms or in Net-Comm directed efforts, with the number

expected to triple by 2004 (Adams, 2000). Virtually all businesses and nonprofit institutions have dedicated Web sites, which means that many design studios are engaged in designing and maintaining them. Companies are in a constant competitive search for talented web designers, seeking workers who are creative thinkers with strategic expertise and excellent communication skills. Ideally these workers need a solid combination of creative ability and technical experience. If a potential employee does not excel in both areas, then creativity is the more important factor because it is thought that technical skills, which change rapidly, can be learned more readily (Schwartz, 2000).

The hiring process for these workers is complicated, as someone who fully understands the field and technology must evaluate interactive job candidates carefully on the basis of their work, skills, and academic degrees. Interactive employees command higher compensation packages than print designers. According to the Bureau of Labor Statistics, interactive technical workers make on the average 39 percent more than graphic designers (Schwartz, 2000).

School to Career

In December 1994, past-President Bill Clinton and thirteen heads of large corporations announced the creation of the School-to-Work Opportunities National Employer Leadership Council. The School-to-Work Opportunities Act of 1994 provided “venture capital” funding to States and local communities to support efforts to increase student achievement and prepare young people for postsecondary education and careers. The U.S. Department of Education and the U.S. Department of Labor jointly administer the National School-to-Work Office to support the development of STW initiatives across the nation (Public Forum Institute, 2000).

According to James R. Houghton, Chairman of the U.S. Labor Department's National Skills Standards Board, the United States has the worst school-to-work transition in the industrial world (Getty Arts Foundation, 1999). Houghton claims that of the approximately six to seven million jobs which will be created in this country in the final years of the century, it is estimated that approximately only one half of the people entering the workforce during that time period will be equipped for those jobs.

The importance of thinking skills to the new workplace is evident in the high-performance teams that are today bridging the divide between manual and mental work in corporations throughout America. Data from multiple research methodologies including case studies, broader statistical research relating education to economic change, occupational data, and studies of the changing wage structure all support the emerging picture that the information age workplace will have a rising demand for higher-skilled and more-educated workers (Law, Knuth & Bergman, (1992).

According to Grubb (1997), the majority of high school students view their schoolwork as necessary to their future employment; however, traditional high school subjects often have the least application to the world of careers and adult responsibilities. Grubb sees one solution to this problem is simply to reverse the separation between academic and vocational purposes that took place at the turn of the century.

Workers need different skills than in the past. Innovative workers need to be able to communicate effectively and work in teams; they need to be able to read, write and compute with competence. Innovative workers needs to change, solve problems, set goals, and be able to learn continuously (Kappner, 1997).

Although funding from the School-to-Work Opportunities Act ended on October 1, 2001, states and localities were expected to assume responsibilities for STW systems already in place. A total of more than 1500 STW partnerships were funded in all 50 states among educators, employers, labor, parents, students, and community-based organizations. Collaborations, partnerships, and internships all help to give graphic design students opportunities to experience some of the specialized career areas in that industry.

Summary

The review of literature gives a detailed look at the similarities and contrasts between fine art and graphic design. The literature helps clarify overlapping and confusing terms, and explains the differences between the two courses of study or curriculum content areas of “fine” and “applied” art. The concept of “visual communications” is explored, as well as the importance of communication in the global marketplace. The relationship between graphic arts and visual communications is emphasized, and it is noted that there are many and varied jobs available for people who have studied graphic design, while few jobs exist for graduates with fine art degrees. Although there is an identified shortage of workers in visual communications fields that could be addressed by more graphic design programs in schools, post-secondary institutions continue to turn out fine art graduates who struggle with limited career potential.

The literature review found few studies that address the complexities of the relationship that exists between fine and applied arts, nor did the literature review uncover existing research comparing work opportunities for fine artists with work

opportunities for applied artists. However, the literature does reveal that traditionally those artists called “applied” make art (work) for money, while “fine” artists do their work for a different purpose. Historically research has been limited in the field of art, but both the National Art Education Association (NAEA) and American Institute of Graphic Arts (AIGA) have current research agendas.

While the separation between fine and applied art continues to persist, the study of graphic design is not consistently included in either of these curriculum areas. Graphic design, or “communication arts” is treated differently by different schools and different teachers. The study of graphic design can be found in numerous educational settings, resulting in a variety of different degrees and certificates. Graphic design content does not have a firm place in the curriculum of American schools, yet a shortage of workers in the visual communications industries is evident and will continue to grow with the expansion of the Internet and other new digital technologies.

The integration of technology is designated as a high priority issue in modern education across the curriculum, and addressed by numerous agencies that identify educational standards. Computers are a primary tool for graphic designers, and complex software is used throughout the visual communications industry, therefore it is natural to integrate technology in graphic design instruction. However, for graphic design to be included in the fine art curriculum, teachers must be able to use and teach with computers, or have an alternative way to deliver the content.

Although the roots of good design are intertwined with the arts by the aesthetic foundations of drawing, painting and color theory, computers continue to seem foreign to many art educators. The literature indicates that arts education can help equip young

people for job success because it demands high performance and develops key cognitive skills such as analysis, synthesis, creativity and decision-making. However, little could be found in the literature promoting art education as a means to secure career opportunities in graphic design or other design-related fields that fully integrate technology expertise.

John Dewey, more than any scholar since, recognized that all education is, in some sense, vocational, and that Americans ignore this fact at their own peril (Steinberg, 1998). The present research emerges as a result of the perceived importance of breaking down the barrier of “status” between fine and applied arts, which could be to the benefit of art and design students by introducing them to a variety of creative, challenging, and interesting career choices.

The research seeks to provide empirical data on the attitudes of pre-service art teachers about fine and applied arts, as well as data on the viability of using a web-based teaching tool to explore the graphic design content area. It is believed that the potential for any significant change in art education most likely rests with pre-service teachers, the participants in the study.

CHAPTER 3

METHODOLOGY

Introduction

The objectives of this study were to (a) examine the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum, (b) examine the beliefs of pre-service art teachers about jobs and availability of jobs for artists, (c) examine the beliefs of pre-service art teachers about the importance of artists and art teachers to know how to use technology, (d) examine self-reported computer/technology expertise and numbers of prior computer courses taken by pre-service art teachers, (e) examine what pre-service art teachers learned from a multimedia teaching tool and their attitudes about it, (f) explore the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum, and (g) examine the need for further technology training. In addition, this study examined several of the associations between these concepts.

The purpose of this chapter is to present the methodology that was used to conduct the study. Chapter sub-headings of (a) research design, (b) population and sample, (c) instrumentation, (d) multimedia teaching tool, (e) procedures and (f) data analysis explain the research objectives, procedures and methods.

Research Design

A quantitative, associational design was used for the research. The first stage of the experiment was conducted by administering a Likert-type attitude survey to the participants. The attitude survey was followed by guided direction through an interactive web site multimedia teaching tool about graphic design and graphic design careers. Following the guided direction an objective test was given to participants that covered information contained in the web site. Concluding attitude questions about the viability of using the multimedia and participants' perceived need for further technology training completed the study. The collected data was analyzed by using both descriptive statistics and correlations.

Population and Sample

The experimentally accessible population was limited to pre-service art teachers at two Colorado universities: Colorado State University and the University of Northern Colorado. Participants were selected based upon the criterion of being a student of junior or senior standing in a teacher education program at either of the universities. The participants were specifically studying to become art educators.

Colorado State University and the University of Northern Colorado were selected as the sources for participants in the study because they both offer degrees in art education. The junior and senior university student participants were enrolled in art teacher preparation programs at the identified schools. All participants in the study had completed at least two years of the academic requirements for a Bachelor of Arts degree in Art Education.

The participants were from existing, intact classrooms. Students participating in the study were all enrolled in an art education “Methods” course. According to Galbraith (1997) the “Methods” course is one of the most important professional courses in an art education program.

Instrumentation

The researcher developed two instruments that were used in the study. A Likert-type attitude scale plus demographic questions, and an objective test about graphic design and related careers were designed specifically for use in the study. A web-based interactive multimedia teaching tool about graphic design and related careers was also developed by the researcher, and viewed by study participants prior to taking the objective test.

Likert-Type Attitude Survey and Demographics

A Likert-type survey (Appendix A) was developed to measure the participant’s attitudes in three general areas. Answers to the 10 attitude questions were rated on a 5-point scale: 1 = “strongly disagree,” 2 = “mildly disagree,” 3 = “neutral,” 4 = “mildly agree,” and 5 = “strongly agree.” The instrument was designed so 5, or “strongly agree,” was the most positive response. Two questions were asked in the reverse; they were recoded in the analysis so 5 would again be the most positive response. In addition respondents noted the number of computer courses taken, with 1 the least number and 5 the highest.

Figure 1 shows a sample of Likert scale items within the variable of placement of graphic design content in the fine art curriculum.

1. I believe that graphic design should be taught to high school students as part of the fine arts curriculum.		
_____	Response	Score Assigned
_____	Strongly Agree	5
_____	Mildly Agree	4
_____	Neutral	3
_____	Mildly Disagree	2
_____	Strongly Disagree	1
2. I believe that the subject of graphic design should be taught in a vocational setting rather than a department of fine art.		
_____	Strongly Agree	5
_____	Mildly Agree	4
_____	Neutral	3
_____	Mildly Disagree	2
_____	Strongly Disagree	1

Figure 1. Sample of how Likert scale items were scored

The questions were collapsed to form three scales: (a) whether the study of graphic design should be part of a secondary fine arts curriculum; (b) perceptions about the number and availability of jobs for artists; and (c) the importance for artists and art teachers to know how to use technology. Participants were asked to self-report their personal level of technology expertise on a 5-point scale, with “1” being the lowest level and “5” being the highest level. Participants also indicated the number of computer courses taken in high school and college, the number of graphic design (or computer graphics) courses taken, and the number of educational technology courses completed. Further demographic information on participants included gender, age, and area of art specialization or expertise.

The newly constructed variables were created by using the mean of several questions. Table 1 illustrates the construction of the four scales or constructs.

Table 1

Constructs I, II, III, and IV Measured on Likert Scale and Corresponding Questions

Construct	Section of Likert Scale & Construct Name	Question Numbers
I	Attitudes about where graphic design should be placed in high school curriculum	(Q 1, 2R, 6)
II	Perceptions about jobs and availability of jobs for artists	(Q 3, 4, 5)
III	Negative beliefs about the importance of artists and art teachers to know how to use technology	(Q 7, 8, 9, 10R)
IV	Computer/technology expertise and prior computer courses	(Q 11, 12) + questions regarding graphic design and educational technology courses

The Objective Test

A thirty-five item objective test about graphic design and graphic design careers was developed by the researcher (Appendix D). The test items were aligned with information contained in the multimedia and designed to measure knowledge about graphic design and related graphic design careers. The score received on the test was used to form a measure of “knowledge of graphic design.” The objective test questions were followed by five additional attitude questions, which allowed participants to indicate their conclusions about using the teaching tool on a scale of 1 to 5, ranging from 1 = “strongly disagree” to 5 = “strongly agree.” Four questions were collapsed to form a scale measuring the viability of using the multimedia teaching tool. The final attitude

question measured the participants' perceived need for further training to use the multimedia teaching tool. Table 2 illustrates the construction of these scales.

Table 2

Constructs V, VI, and VII Measured on Likert Scale and Corresponding Questions

Construct	Section of Likert Scale & Construct Name	Question Number
V	Knowledge of graphic design	(Objective Test Q1-35)
VI	Viability of using the multimedia teaching tool	(Concluding Attitude Q13-16)
VII	Need for further training to use the multimedia teaching tool	(Concluding Attitude Q17)

Construct V measured the participants' knowledge of graphic design and graphic design careers with a 35-item objective test. Although some of the participants may have had prior knowledge about graphic design, the questions of the test were aligned to match the information contained in the multimedia teaching tool.

Construct VI looked at the viability of using the multimedia teaching tool. Participants were asked four questions about their perceptions of ease of use and general usefulness of content contained in the teaching tool. Construct VII consisted of one question that asked participants about their perceived need for further training to be able to use the teaching tool.

The Multimedia Teaching Tool

A multimedia teaching tool (Appendix B) was designed to be understood by people with little or no prior knowledge about graphic design and to be easily used by teachers and students with little or no technology expertise. The plan for the multimedia

was to be generally useful to an audience of high school art teachers and students, career teachers, students in school-to-work programs, university students studying to become high school art teachers, postsecondary students studying for careers in the graphic design field, and students studying to become graphic design teachers, regardless of their prior level of knowledge about the field of graphic design. The overall goal for the development of the multimedia teaching tool was to compile a broad body of knowledge with related Internet links that would provide a comprehensive overview of the field of graphic design, as well as to identify and explain the many career fields associated with that industry.

Developing the web-based interactive multimedia presented a myriad of design and technical issues. Using a wide variety of resources, the researcher first constructed a precise outline of the information to be relayed. The final outline form was a detailed storyboard for the project (Appendix C) developed using Microsoft PowerPoint presentation software. Although PowerPoint has the capability of adding sound and animation, it is a linear presentation program that does not allow a user to move in a variety of directions. Therefore, although PowerPoint was suitable for the development of the storyboard, it was determined not to be suitable for the final instrument.

Using PowerPoint allowed the researcher to organize the large amount of information which was to be incorporated into the project by sorting and resorting slides. The storyboard was organized into six main categories:

Part One – Introduction, Definitions, Brief History;

Part Two – Images and Type;

Part Three – Similarities between Graphic Design and Fine Art, The Difference Between Graphic Design and Computer Art, The Design Elements and their Importance in Graphic Design;

Part Four – Jobs and Careers for Graphic Designers and Salary Information;

Part Five – More Job and Career Information;

Part Six – The Education of a Graphic Designer, Professional Organizations, Professional Publications and Portfolios.

Within the main categories of the storyboard, the particular jobs and careers for graphic designers covered in Parts Four and Five were advertising, animation, book design, corporate design, desktop publishing, exhibition design, film design, illustration, magazine design, newspaper design, package design, teaching, type design, video game design and web design. Also, kinds and sources of images used by graphic designers, typography, design elements, the design process, professional publications, and professional organizations were explored.

John Gravdahl, Associate Professor of Graphic Design at Colorado State University, reviewed the finalized storyboard. Feedback resulted in some minor modifications, after which the researcher was ready to begin production of the final version of the multimedia teaching tool.

The next phase of the project was to prioritize and categorize the information from the storyboard, creating an information hierarchy. The PowerPoint storyboard showed the information in a linear progression, similar to a book. An objective for the multimedia teaching tool was to present an array of information that could be explored by viewers in any order, with viewers using visual cues to know where they are and how to get where they want to go.

A variety of multimedia and presentation software was explored in the early development phase of the multimedia project. ClickWorks™, an interactive software product by Pitango Multimedia Ltd, an affiliate of Scitex Corporation Ltd. was used in the first trial. ClickWorks™ was originally chosen for the project for several reasons. First, and most important, was the fact that ClickWorks™ was promoted to be a true cross platform product and projects could be played back using a free Mac or PC software player supplied with the software.

Another important feature required for the development of the multimedia was to use software that could link to the Internet. In 1998-99 ClickWorks™ advertised an extension called “WebLink” to retrieve text or graphics from a web site. The web connection would activate during presentation play time so that up to the minute information from the Internet could be embedded into a fixed media-based project. Approximately 8 months into the project, it became apparent that ClickWorks™ did not offer necessary continuing technical support and the software was abandoned.

Following experimentation with ClickWorks™ other software was explored including iShell by Tribeworks, Toolbook, Macromedia Director, and Macromedia Dreamweaver. Over the course of approximately one and a half years rapid advances in multimedia capabilities of numerous programs became apparent, and some of the issues surrounding cross platform capabilities and the desired ability to link with current web sites were addressed by the industry.

During the process of developing the multimedia teaching tool, rapid growth and greater accessibility of the Internet prompted the researcher to consider an “on-line” presentation rather than the originally planned multimedia CD. This would eliminate the

probability that information would be quickly outdated, or that web links from a fixed media CD may not update, or in fact may not work at all. A web site would contain the pertinent information identified in the storyboard, be relatively easy to edit, and the desired interactivity and advanced features could be found in links to existing web sites.

The early experimentation with multimedia software and the lack of technical support for software products new on the market prompted the researcher to consider using a common web page product. Microsoft FrontPage was determined to be user friendly, readily accessible, and fully supported. Following completion of the storyboard and site plan, the researcher developed the multimedia teaching tool for the project.

Procedures

Approval to conduct the research was received from the Office of Regulatory Compliance at Colorado State University. The study was completed at Colorado State University and the University of Northern Colorado, the schools attended by participants in the study.

Prior to the actual date(s) of the study, the researcher's contact person at each university notified participants about the study. At both universities, the contact person was a professor of art education. Because the subjects were from intact classrooms, permission of the professors of the courses involved was obtained so that the experiment could be conducted during a regularly scheduled class time. Appendix E contains a copy of the letter requesting permission to conduct the study. Appendices F and G contains copies of the responses from the university professors.

The researcher had asked the professor of the classes involved to make arrangements for the participants to meet at the time of the study in a computer lab rather

than in a regular classroom. The researcher met with the participants at the time of the scheduled class(es). First the researcher introduced herself, then explained the project and outlined the overall objectives for the research. Each participant was given the Likert-type attitude survey which was also used to collect participant demographic data. After the surveys were completed and collected, the participants were ready for a guided exploration of the web site multimedia teaching tool.

The researcher told the participants the Internet address of the multimedia teaching tool about graphic design. The researcher used a computer and projection system so participants could see the address and index page of the teaching tool web site. The participants were instructed how to get to the index page of the multimedia teaching tool. Some participants needed help getting to the web site, and they received assistance from the researcher.

When all participants were on the index page, the researcher began to guide them through the pages of the teaching tool. This guided exploration was explained and projected, and participants followed at their own workstations. The time allowed for the exploration was 30 minutes. The guided exploration was followed by a 35-item objective test about graphic design and graphic design careers. Five Likert-type items were at the end of the objective test. These five attitude items asked participants for concluding perceptions about the use of the multimedia teaching tool.

Finally, each participant was given an information sheet to keep with the researcher's name, e-mail address, and the web site address of the multimedia (Appendix H). Participants were encouraged to visit the web site again and submit further feedback if desired. At the conclusion of the time, participants were each given a small gift in

appreciation of their contribution to the study. The participants were thanked both in the group and individually for their cooperation. A letter was sent to the professors of the courses involved in the study thanking them for their participation (Appendix I).

Data Analysis

The objectives of this study were to (a) examine the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum, (b) examine the beliefs of pre-service art teachers about jobs and availability of jobs for artists, (c) examine beliefs about the importance of artists and art teachers to know how to use technology, (d) examine computer/technology expertise and prior computer courses of pre-service art teachers, (e) examine what pre-service art teachers learned from a multimedia teaching tool and their attitudes about it, (f) explore the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum, and (g) examine the need for further technology training. In addition, this study examined several of the associations between these concepts. To examine these purposes a variety of descriptive statistics and graphics/figures were used.

Data was analyzed using the Statistical Package for the Social Sciences (SPSS version 9.0) for Windows. This data analysis was facilitated with a software resource guide by Morgan and Griego (1998). Microsoft Excel for Windows was also used for various elements of the data analysis.

Research questions 1-7 required descriptive analysis. Following the descriptive questions, there were two major questions requiring inferential statistical analysis. The first seven descriptive questions were as follows:

1. What are the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum?
2. What are the beliefs of pre-service art teachers about jobs and availability of jobs for artists?
3. What are the beliefs of pre-service art teachers about the importance of artists and art teachers knowing how to use technology?
4. How do pre-service art teachers self-report their expertise and background for using computers/technology?
5. How did pre-service art teachers answer 35 separate items of an objective test about graphic design and related careers?
6. What are the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum?
7. Did pre-service art teachers believe they would need more training to use the multimedia teaching tool?

Research questions 8 and 9 required inferential statistical analysis. Question 8 pertained to significant relationships among the seven constructs described in this chapter, which are listed above. Question 9 dealt with relationships between age and gender of pre-service art teachers and the seven constructs listed above. Statistical analysis of questions 8 and 9 was performed using the Pearson product-moment correlation coefficient.

CHAPTER 4

RESULTS OF THE STUDY

The data for this study was collected in November 2001. The statistical results shown in this chapter reflect data drawn from a total of 30 subjects. A description of the sample that participated in the study is provided. The sample description includes response rate, gender, age, area of art specialization, and self-reported information about level of technology expertise. Descriptive statistics for research questions 1- 7, and statistical analyses pertaining to research questions 8 and 9 follow the description of the sample.

Description of Sample

Response Rate

Three Colorado colleges that offer bachelor's degrees in art education were originally contacted regarding participation in the study. These schools were Mesa State College in Grand Junction, University of Northern Colorado in Greeley, and Colorado State University in Fort Collins. After discussions with directors of the art education programs at each school, it was decided that Mesa State would not participate because there were only two students who currently met the criteria for the study. The University of Northern Colorado had 16 students in a teaching methods course for pre-service art teachers, and Colorado State University also had 16 students in a teaching methods

course. On the night of the experiment, two students were absent from the University of Northern Colorado, making a total N of 30.

Gender

There were approximately three times as many females as males in the study. Eight males and 22 females participated in the study.

Age

Respondents in the study ranged from 20 years to 45 years of age. Figure 2 contains a summary of the ages of the participants. The largest group of participants was in the category of 20-25 years of age, which is the age range for “traditional” university students. There were 14 pre-service teachers, or 47 percent of respondents who were in the “traditional” age group. Sixteen pre-service teachers were in the “non-traditional” age group, or 53 percent.

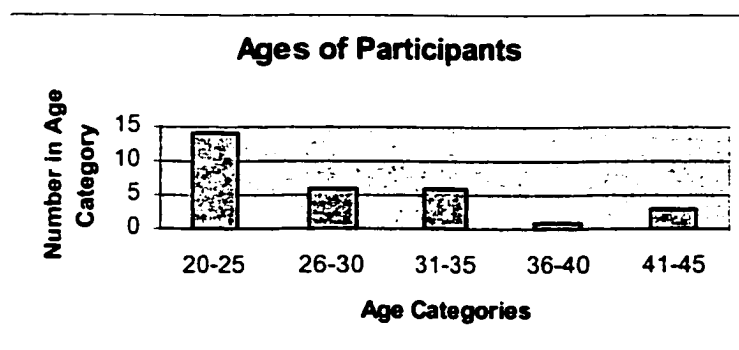


Figure 2. Ages of participants in the study.

Area of Art Specialization

Figure 3 shows that the majority of the pre-service art teachers in the study identified painting and ceramics as their main areas of interest or specialization. The survey question stated “Please name your favorite area of specialization or expertise as an artist.” Some of the respondents named more than one area of specialization; 15 respondents named one specialization, 8 respondents named two areas of specialization, 1 respondent named 3 areas, and 1 respondent named 4 areas of specialization.

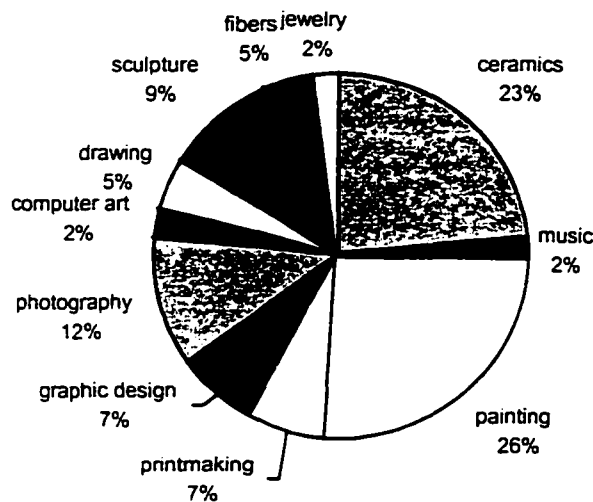


Figure 3. Area of art specialization.

Three participants, or 9 percent of the total, named graphic design or computer art as their main area of interest or specialization. Ceramics and painting were the largest areas of interest, with 23 percent of respondents naming ceramics and 26 percent naming painting as their area(s) of specialization. Forty-nine percent of the respondents named ceramics and/or painting as their area(s) of specialization.

Analysis of Research Questions

Research Question 1

What are the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum?

The Likert-scale attitude survey (Appendix A) contained three questions (Q1, Q2 and Q6) that pertained to the attitudes of the pre-service art teachers about placement of graphic design content in the high school curriculum. Answers to the attitude questions were given on a 5-point scale with the following categories: 1 = “strongly disagree,” 2 = “mildly disagree,” 3 = “neutral,” 4 = “mildly agree,” and 5 = “strongly agree.”

Respondents were asked about their beliefs regarding teaching graphic design to high school students as part of a fine arts curriculum, and teaching graphic design in a high school vocational setting rather than a fine arts department. Descriptive statistics for the three variables regarding placement of graphic design content in high school curriculum are reported in Table 4. Survey respondents supported placing graphic design content in a fine art program more than in the vocational setting.

Table 3

Descriptive Statistics for Graphic Design Placement in Curriculum Variables (N=30)

Variable	Mean	Standard Deviation
Graphic Design Content Should be in Fine Art Curriculum (Q1)	4.64	.76
Graphic Design Content Should be in Vocational Curriculum (Q2R)	1.13	.34
Graphic Design Technology Skills Should be Taught in Fine Art Program(Q6)	4.07	.91

Note: Scale is 1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree

Fifty percent of the respondents strongly agreed with the statement “I believe graphic design should be taught to high school students as part of the fine arts curriculum.” Another 26 percent mildly agreed with the statement.

Forty-three percent of respondents were neutral on the statement “I believe that the subject of graphic design should be taught in a vocational setting rather than a department of fine art.” Another 40 percent either mildly or strongly disagreed with the statement, and 16 percent mildly agreed with the statement. Twenty-one respondents, or 70 percent, either agreed or strongly agreed that the technology skills necessary to work in the field of graphic design should be taught in an art department.

Research Question 2

What are the beliefs of pre-service art teachers about jobs and availability of jobs for artists?

The beliefs of the pre-service art teachers regarding jobs and job availability for artists were measured on a 5-point Likert-type scale. The respondents were asked about

their beliefs regarding the “many good jobs for artists with BFA degrees,” “easy to find a job for graduates with BFA and MFA degrees,” and “easy to find a job for talented art student graduates.” Table 4 reports the descriptive statistics for these variables.

Table 4

Descriptive Statistics for Artist Job Variables Pertaining to Number and Availability of Jobs for Artists (N=30)

Variable	Mean	Standard Deviation
Many good jobs for artists with BFA degrees (Q3)	3.33	1.15
Easy to find a job for graduates with BFA or MFA degrees (Q4)	2.53	.97
Easy to find a job for artistically talented graduates (Q5)	2.43	1.01

Note: Scale is 1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree

The mean for the variable regarding “many good jobs for artists” is higher than the means for the two variables about “easy to find jobs,” which indicates that the participants believed there are good jobs available, but that these jobs are not easy to find.

Research Question 3

What are the beliefs of pre-service art teachers about the importance of artists and art teachers knowing how to use technology?

The survey included four questions that pertained to the attitudes of the pre-service art teachers about the use of technology for artists and art teachers. Table 5 shows the means and standard deviations for each of the four questions.

Table 5

Descriptive Statistics for Pre-Service Art Teachers' Attitudes Regarding Use of Technology in Teaching and Learning Variables (N=30)

Variable	Mean	Standard Deviation
Artists do not need to know how to use technology. (Q7)	1.70	1.09
Art teachers do not need to know how to use technology. (Q8)	1.60	1.22
Art teachers do not need to know how to teach technology. (Q9)	1.77	1.19
Teacher training programs for secondary art teachers should require all students to take two or more courses in graphic design or computer graphics. (Q10)	3.43	1.19

NOTE: Scale is 1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree

Questions 7, 8, 9 and 10 measured Construct III, negative beliefs about artists and art teachers' needing to know how to use technology. Questions 7, 8, and 9 were phrased negatively on the survey. Question 10 was not phrased negatively, therefore question 10 was reverse scored to make the scoring consistent with the other questions averaged to make the construct.

Twenty-five respondents, or 83 percent either mildly or strongly disagreed that artists do not need to know how to use technology, indicating that the majority of the participants believed that artists do need to know how to use technology. The mean score for question 7 was 1.70 with a standard deviation of 1.09. Question 8 showed a similar result, with 26 respondents, or 86 percent, indicating that they either mildly or strongly disagreed that art teachers do not need to know how to use technology. The mean score

for question 8 was 1.60, and the standard deviation was 1.22. Twenty-three respondents, or 76 percent, either mildly or strongly disagreed with the statement “art teachers do not need to know how to teach technology” (Question 9). The mean score for question 9 was 1.77, with a standard deviation of 1.19.

Question 10 pertained to requiring students in art teacher training programs to take courses in graphic design or computer graphics. Six respondents strongly agreed with this requirement, 11 mildly agreed, 4 were neutral, 8 mildly disagreed and 1 strongly disagreed.

Overall responses to the four questions of Construct III indicate that the pre-service art teachers (respondents) feel that artists and art teachers need to know how to use technology, and art teachers need to know how to teach technology. However, the belief was not as strong that teacher training programs should require pre-service art teachers to take two or more courses in graphic design or computer graphics.

Research Question 4

How do pre-service art teachers self-report their expertise and background for using computers/technology?

Participants were asked four questions that related to their use and knowledge of technology. The first question was a self-reported level of technology expertise. The scale for the self-reported level of expertise was 1-5, with 5 being the highest or “expert” level. The second question asked participants to indicate how many computer courses they had taken in high school or college, with 1 being the least number and 5 the highest. For the final two questions regarding number(s) of courses in graphic design and educational technology, respondents were asked to fill in a blank to indicate how many courses they

had taken in each area. A listing of the means and standard deviations for each question is shown in Table 3. This self-rating of computer expertise and the number of computer courses taken was averaged to form Construct IV, described Chapter 3 and used in research questions 8 and 9.

Table 6

Descriptive Statistics for Technology Expertise Variables (N=30)

Variable	Mean	Standard Deviation
Self-reported Level of Technology Expertise ²	2.97	.96
Number of Prior Computer Courses Taken in Either High School or College	2.84	.87
Number of Graphic Design Courses Taken	1.27	1.93
Number of Educational Technology Courses Taken	1.30	.84

²Based on a 5-point scale with 1 = lowest level of technology capability and 5 = highest or “expert” level of computer/technology degree of expertise

The question about self-reported level of technology expertise asked the study participants to rate their degree of computer/technology expertise on a scale of 1-5. One was the lowest level, with 5 considered the “expert” level. The question read “On a scale of 1 –5, with 5 being an ‘expert level’ please rate your degree of expertise for using computers/technology.” The term “expert” was not defined for the participants, therefore the self-rating was a result of each participant’s own definition of the term.

The mean score for the question about technology expertise was 2.97, indicating that overall the group self-rating was approximately “average.” Only one participant rated

himself as “expert” (level 5). Eight respondents, or 28 percent, rated themselves as (level 4), 12 participants, or 41 percent rated themselves as (level 3), 7 participants, or 27 percent, rated themselves as (level 2), and 2 participants indicated (level 1). Overall, seventy percent of the respondents rated themselves to be average or better users of computer/technology, while 30 percent rated themselves below average users of computers/technology.

The second question asked participants to indicate the number of computer courses they had taken in high school and college. The mean score for number of computer courses taken in high school and college by the respondents was 2.87.

The third question pertained to the number of graphic design courses each respondent had taken. The mean score for graphic design courses taken by participants in the study was 1.27. Sixteen respondents, or 53 percent, reported they had never taken a graphic design course. The responses for this question ranged from 0 – 7 courses taken. The standard deviation for the first question was 1.93. Three of the respondents reported they had taken multiple courses in graphic design, with one respondent reporting 7 courses, one reporting 6, and one reporting 5.

The fourth question pertaining to the participants’ technology expertise asked about the number of educational technology courses each respondent had taken. The mean score for this question was 1.3, or slightly higher than the average number of graphic design courses taken by the respondents. However, three respondents reported not having taken an educational technology course, and 18 respondents, or 60 percent, reported taking one educational technology course. The range of scores for this question

was from 1 – 4, and the standard deviation was .84, indicating a smaller variance than for the first question.

Research Question 5

How did pre-service art teachers answer the 35 separate items of an objective test about graphic design and related careers?

Table 7 shows the percent of respondents who answered each of the 35 objective test questions correctly. Table 7 indicates that 9 of the objective test questions (or 26 percent of the test) were answered correctly by 90-100 percent of the survey respondents. Six of the questions, or 17 percent, were answered correctly 80-89 percent of the time.

The questions that received high percentages of correct answers were general questions about design and graphic design, as well as the questions about education and careers for graphic designers. It is possible that respondents had gained such knowledge in their background for training to be art educators. Also, it is possible that the answer to some of these questions would be considered “common knowledge” for those studying the arts. An example of such a question would be Q25; “The most important thing a graphic designer has in a search for a job is...” The answer “portfolio” should be common knowledge for anyone studying the arts, and was answered correctly 97 percent of the time.

Table 7

Descriptive Statistics for 35-Item Multiple Choice Objective Test about
Graphic Design and Related Careers (N=30)

Question Number	Question	Percent Correct
1	What are the principle elements of any graphic design?	63
2	What is the primary role of a graphic designer?	91
3	What does graphic design education encompass?	74
4	What do professional organizations for graphic designers provide?	74
5	Who do illustrators usually work for?	26
6	A concentration of graphic design jobs is usually found in what type of geographic location?	71
7	What do all design problems follow from start to finish?	40
8	Historically, what has the work of graphic designers been related to?	40
9	Why has the number of jobs for graphic designers increased dramatically in recent years?	91
10	What are the characteristics of people who are best suited to work in the graphic design industry?	89
11	What is the first step in solving a graphic design problem?	80
12	Which type of graphic design work did the US Job and Labor Outlook Handbook project as one of the fastest growing careers in the country?	66
13	What graphic design career is relatively new and growing rapidly?	89
14	What graphic design career has a strong impact on consumers?	94
15	Where is graphic design education available?	97

Table 7 continued

16	What graphic design career requires the designer to work in three dimensions?	89
17	What is the licensing or certification for graphic designers?	43
18	What are the two main categories of graphic designers?	23
19	What is the specialized area called for designers who are preparing documents for a printer?	54
20	What is “visual communication?”	91
21	What is the primary difference between an illustrator and a “fine artist?”	86
22	What does the term “typography” refer to?	63
23	How far back in history is the “birth” of graphic design?	77
24	What do “Bitstream,” “Émigré,” and “Will Harris” refer to?	17
25	What is the most important thing for a graphic designer to have in a search for a job?	97
26	What is the largest mass communication producer?	26
27	What is a good source for students looking for information about careers (or possibly jobs) in animation?	57
28	What part of a book gives the first impression, and frequently sways potential purchasers/readers?	91
29	What kind of designer creates an inclusive, coordinated design system consisting of standard typefaces, layouts, and colors, that seeks to reinforce the image of a particular business?	37
30	What has replaced traditional typesetters, separators, and pre-press houses in recent years?	11
31	What is a specialized kind of graphic design that incorporates areas of design, architectural and product design, and multimedia expertise?	94

Table 7 continued

32	Editorial, medical and natural history are areas of specialization in what field?	40
33	Art, programming, animation and psychology are important factors in the development of what design specialization?	63
34	Which design specialization uses information architecture, HTML code and graphics images?	89
35	Why is reading professional publications important for graphic designers?	100

Note: The 35 item objective test questions were all multiple choice. Table 7 gives the concept of each question, but not the multiple answer choices. The complete test can be found in Appendix E.

The questions about jobs that have technology connections were answered correctly more often than questions about print design. For example, Q9, ("The number of jobs for graphic designers has increased dramatically because of") was answered correctly 91 percent of the time. The answer was "advances in technology." However, question Q30 ("In recent years traditional typesetters, separators, and prepress houses have been replaced by") was answered correctly only 11 percent of the time. Q34 pertained to the job of web design, and contained the term "HTML code." This question was answered correctly 89 percent of the time. Q13 about the new and rapidly growing career of video game design was answered correctly 89 percent of the time, while Q17 about type design was answered correctly only 17 percent of the time.

The objective test was scored on a scale of one point per question. The highest score was 32 points (out of 35), and the lowest was 16 points. The mean score for the objective test was 23.17, and the standard deviation was 3.80.

Research Question 6

What are the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum?

Table 8 shows the means and standard deviations for questions pertaining to Construct VI (viability of using the multimedia teaching tool). The variable pertaining to the belief by pre-service art teachers that high school art students could gain enough information from the multimedia to pursue further study (in graphic design) shows a mean score of 4.37 on a 5-point scale, indicating a strong agreement that the pre-service teachers believed the teaching tool was viable.

Table 8

Descriptive Statistics Regarding Pre-Service Art Teachers Perceptions about the Viability of Using Web-Based Multimedia for Teaching Graphic Design (N=30)

Variable	Mean	Standard Deviation
Amount of new information learned about graphic design and careers from the multimedia	3.67	.76
Belief that high school art students could gain enough information from the multimedia to pursue further study	4.37	.56
Ease of use of multimedia to introduce graphic design content to high school art students	4.43	.50
Pre-service teacher interest in further study of graphic design content	2.67	.99

NOTE: Scale is 1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree

The mean for the question regarding “ease of use” of the multimedia teaching tool was 4.43. This showed that the pre-service teachers strongly agreed that the teaching tool easy to use. The fourth question of this construct asked if the pre-service teachers gained interest to further study graphic design content. The mean for this question was 2.67, indicating the participants themselves were relatively disinterested in further study of graphic design.

Research Question 7

Did pre-service art teachers believe they would need more training to use the multimedia teaching tool?

Table 9 shows the mean and standard deviation for the perceptions of pre-service teachers about the need for further technology training to be able to use the multimedia teaching tool about graphic design and related careers. The survey question asking the pre-service teachers about their perceived need for further technology training was on a scale of 1-5, with 1 = “strongly disagree” that more training is needed, and 5 = “strongly agree” that more training is needed.

Table 9

Descriptive Statistics for Perceptions of Pre-Service Art Teachers about the Need for Further Training to use a Multimedia Teaching Tool (N=30)

Variable	Mean	Standard Deviation
Need for further technology training to use multimedia teaching tool	3.07	1.44

NOTE: Scale is 1 = strongly disagree, 2 = mildly disagree, 3 = neutral, 4 = mildly agree, 5 = strongly agree

Seven pre-service teachers indicated by their answers that they “strongly disagree” (that they need more training), indicating that they feel that they already have sufficient technology skills to be able to use the web-based multimedia. Four pre-service teachers indicated that they “strongly agree” (that they need more training), and 12 pre-service teachers indicated that they “agree” (that they need more training). The sixteen teachers who indicated that they agree or strongly agree that they need more training represent slightly more than half (53 percent) of the population of the study.

Research Question 8

Are there any significant relationships among the seven constructs described in chapter 3? The constructs are: (a) attitudes about where graphic design should be placed in the high school curriculum, (b) perceptions about jobs and availability of jobs for artists, (c) beliefs about the importance of artists and art teachers to know how to use technology, (d) computer and technology expertise and prior computer courses, (e) knowledge of graphic design, (f) viability of using the multimedia teaching tool, and (g) need for further technology training.

The Pearson correlation coefficient r was calculated to detect significant relationships among the seven constructs. The alpha level was set at .01. Correlations between construct VII, the need for further technology training, and three of the other constructs were statistically significant, as seen in Table 10. A correlation between construct IV and construct III was also statistically significant.

Table 10

Means, Standard Deviations and Intercorrelations Among the Seven Constructs (N=30)

Variable	Construct I (Q1, 2R, 6)	Construct II (Q3, 4, 5)	Construct III (Q7, 8, 9, 10R)	Construct IV (Q11, 12)	Construct V Objective test	Construct VI (Q13-16)	Construct VII (Q17)
CONSTRUCT I Q1, 2R, 6 Attitudes about placement of graphic design in his curriculum	-						
CONSTRUCT II Q3, 4, 5 Perceptions about number and availability of jobs for artists	-0.036	-					
CONSTRUCT III Q7, 8, 9, 10R Negative beliefs about technology use by artists and art teachers	0.015	0.226	-				
CONSTRUCT IV Q11, 12 Tech expertise and prior computer courses	-0.197	-0.289	-0.453*	-			
CONSTRUCT V Knowledge about graphic design (Objective test)	0.158	0.072	-0.061	0.211	-		
CONSTRUCT VI Q13-16 Viability of using multimedia teaching tool	0.136	-0.219	-0.127	0.151	0.153	-	
CONSTRUCT VII Question 17 Need for further technology training	0.539*	0.072	0.218	-0.738*	-0.305*	0.080	-

*Correlations are significant at the 0.01 level (1-tailed)

Construct VII, or the need for further technology training, was found to have a statistically significant positive correlation ($r = .539$, $df = 28$, $p < .01$) with the attitudes of pre-service art teachers about the placement of graphic design in the art curriculum (Construct I). Construct VII had negative statistically significant correlations with Construct IV, technology expertise and prior technology/computer experience ($r = -.738$, $df = 28$, $p < .01$) and with Construct V, knowledge about graphic design measured by a 35-item objective test ($r = -.305$, $df = 28$, $p < .01$). This means that pre-service teachers who acknowledged their need for further training were less likely to claim or report expertise in technology and show less knowledge on the test.

Construct IV, technology expertise and prior technology/computer experience was found to be negatively statistically linked to Construct III ($r = -0.453$, $df = 28$, $p < .01$). Construct III pertained to the beliefs of the pre-service art teachers about the importance of artists and art teachers knowing how to use technology. Therefore, those pre-service teachers with less self-reported technology expertise believed that it was more important that art teachers need to know how to use technology.

Research Question 9

Is there a relationship between age and gender of pre-service art teachers and the seven constructs of the study? The constructs are: (a) attitudes about where graphic design should be placed in high school curriculum, (b) perceptions about jobs and availability of jobs for artists, (c) beliefs about the importance of artists and art teachers to know how to use technology, (d) computer and technology expertise and prior computer courses, (e) knowledge of graphic design, (f) viability of using the multimedia teaching tool, and (g) need for further technology training?

There were no statistically significant correlations between age and the seven constructs, or between gender and the seven constructs of the study. It was thought there might be a strong relationship between age and construct IV, technology expertise and prior technology/computer experience, however the statistical test of Pearson's r revealed the relationship to be extremely weak ($r = .128$, $df = 28$, $p > .05$).

CHAPTER 5

DISCUSSION

Introduction

There were seven objectives for this study outlined in Chapter One. These objectives were to (a) examine the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum, (b) examine the beliefs of pre-service art teachers about jobs and availability of jobs for artists, (c) examine beliefs about the importance of artists and art teachers to know how to use technology, (d) examine computer/technology expertise and prior computer courses of pre-service art teachers, (e) examine what pre-service art teachers learned from a multimedia teaching tool and their attitudes about it, (f) explore the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum, and (g) examine the need for further technology training. In addition, this study examined several of the associations between these concepts.

Demographics

Age

The pre-service art teachers who participated in the study ranged in age from 20 to 45 years. About half of the participants were “traditional” age college students, with the remaining students representing “non-traditional” age groups.

A future study to discover further details about the non-traditional age pre-service art teachers could reveal important information for art teacher training programs. This information could include, but not be limited to, percentage of non-traditional age pre-service art teachers who had previously attained the degree of BFA, percentage who had previously attempted careers as artists, and percentage who were returning to school to become art teachers after exploring fine art career opportunities.

Darling-Hammond (1997) mentioned the figure of two million teachers needed in response to a teacher shortage created by increased student enrollments, reductions in class size, and accelerating retirements among the aging teacher population. In this time of a serious national teacher shortage, the National Art Education Association (NAEA) is questioning how American schools will find future generations of qualified art teachers (Shauk, 2002). Shauk claimed that more than 20 percent of new art teachers opt out within the first three years, and more than a third have left after five years. This attrition rate is due to a lack of support from administration and community, a lack of freedom to teach as new teachers feel they should, a perceived lack of respect, and low salaries.

Further study needs to be conducted to determine the details of motivation for art teachers leaving their careers. The question arises that if non-traditional age students are studying to become art teachers after attempting art careers, are the traditional age students leaving the teaching field after a few years to explore other art careers?

Gender

There were approximately three times as many females as males in the study sample. This is consistent with data reported by Zimmerman (1997) that indicates female art education majors consistently outnumber males by three to one at all degree levels.

Thirty-one female and six male art student teachers participated in a study by Kowalchuk (1999) that looked at the processes novice art teachers go through as they learn to teach.

Singerman (1999) claimed that women art educators have played a major role in shaping the practice of art in colleges and universities. It is interesting to note, however, that when considering the historical population of art teachers in elementary and secondary schools, and with more females enrolled in art teacher training programs, few women teachers have ever come to prominence (Eisner, 1972). *Educating Artistic Vision*, by Eisner, makes a thorough listing of important male art educators, while few females are mentioned.

Although females dominate art teaching, there are few references to female artists in the art history texts studied by most pre-service art teachers. Prior to 1977, there was only one article published in *Studies in Art Education* that dealt with male/female differences (Clark, 1996). Feminist equality in art and art teaching has been difficult, since the notion that “women were biologically unable to create great works of art has been used for decades to keep women in positions of artistic inferiority” (Zimmerman, 1991, p.109).

Future studies pertaining to gender of art teachers and working artists could provide insight into attitudes of pre-service art teachers and university art students with regard to integration of technology with the arts. It would be useful to note whether the new careers available to artists with technology expertise are dominated by male or female workers, and whether the technology instruction that leads to these careers is taught more often by male or female teachers.

Area of Art Specialization

According to Wold and Hastie (1965), “Art as an organized field of study has two distinct yet inseparable bodies of knowledge. One relates to the creation of artistic forms –the ‘doing’ or making of art; the other encompasses the critical analysis of a work of art – looking at and making qualitative judgments about it” (p. 335). Krug and Cohen-Evron (2000) found that art educators have learned to select curriculum topics from the disciplines of art history, art criticism, art production, and aesthetics. This leads teachers to plan lessons by selecting artists, artworks, critical interpretations, time periods, and/or artistic styles. Galbraith (1997) found that although art teacher training programs varied in degree requirements, an average of 36 semester hours of studio coursework is usual in a degree program of 130 total hours.

A study by Kowalchuk (1999) looked at student teaching experiences of pre-service art teachers. In this study many of the student teachers reported that they believed connecting content to student interests and making learning relevant were two important factors in successful art teaching.

A future study of possible importance regarding content for high school art programs would include interviews of art students. By discovering the perceptions of the students about what they want to learn (their interests), and how to make this content relevant could provide important insight to guiding art curriculum decisions.

Descriptives

Research Question 1: What are the attitudes of pre-service art teachers about including graphic design as a content area in the fine art curriculum?

In this study, half of the respondents “strongly agreed” that graphic design should be included in the fine art curriculum, yet only a small percent indicated that graphic

design or computer graphics was their area of specialization or art expertise. According to Schubert (1986), issues of curriculum are integral to the fabric of art teacher education. Gary and MacGregor (1991, p. 287) claimed that teaching art is “very much determined by the values and beliefs of the individual teacher.” Therefore, it stands to reason that although the respondents agreed that graphic design should be part of the art curriculum, it would be unlikely that they would teach this content area if it were not one of interest for them personally and individually.

Another important issue regarding inclusion of graphic design content in the high school fine art curriculum is the accessibility of and ability to use technology. Although graphic design has a long history and was a viable art form with multiple career opportunities long before the popularity of the personal computer, the computer has become an indispensable tool for the modern designer.

Art teachers must know to some extent about a wide variety of tools and materials. The content of painting can include information about different kinds of brushes, different types of paint, and numerous surfaces. Painters may use watercolor, gouache, acrylic, oils, natural or synthetic brushes, canvas, boards, and a multitude of paper types. Potters need to know the properties of different clay bodies, the chemistry of glazes, and how to fire a kiln. Sculptors need to know the properties of various stones, and different techniques for creating works in clay, stone, metal, and wood, as well as about specific tools for the media. Each content area of art has its own set of specialized tools and materials. Secondary art teachers must also be able to teach basic design, drawing, and art history. In addition to painting, pottery and sculpture art teachers may include glass, jewelry, and printmaking.

Being an art teacher “generalist” at the middle school or high school level, requires substantial knowledge in numerous content areas, each with its own set of tools and materials a teacher must know about and be able to use. If graphic design content is included in the curriculum, then the computer (tool) is added to the myriad of existing things in the art teacher’s arena, and somehow a computer seems quite “foreign” in the same space with clay, paint, glass, and stone. School art rooms are usually places of an array of visual activities where art is being produced, and computers do not have a “comfortable fit” with this environment.

Art teachers, especially beginning art teachers, are confronted with huge decisions about how to structure curriculum. Ideally an art specialist or curriculum coordinator will assist in the effort. In addition to the numerous content areas within art education, art teachers must also attend to issues of classroom management which are probably more difficult than those of a math or history teacher (for example). This is because the nature of the art classroom environment allows students to move about “making things,” rather than sitting in seats in rows.

Although a majority of the pre-service teachers in the study indicated that they believed graphic design should be included in the fine art curriculum, in reality there are several reasons why this is difficult to implement. First, a very small percentage of the pre-service teachers reported a focus or interest area in graphic design, and research shows that art teachers teach what they know and like as their personal areas of specialization. Second, the computer as a tool of art is not compatible with traditional existing tools in a studio environment. Third, the teacher may not have the expertise or feel comfortable about using computer technology. Finally, the content area of graphic

design might be taught somewhere in a school curriculum other than in the fine art program.

Research Question 2: What are the beliefs of pre-service art teachers about number of jobs and availability of jobs for artists?

The pre-service teachers indicated by their responses to the questions of Construct II that they believe there are jobs available for artists, yet they do not seem to think it would be easy to find a job, even with an art degree or considerable artistic talent. It is interesting to note that the literature is filled with references to “fine” and “applied arts,” and consistently it is noted that applied art is “inferior,” an art form only to be pursued by those individuals who cannot “make it” as a (fine) artist.

It is perhaps unfortunate that traditionally artists have been thought to create art for a higher purpose than financial gain, because the reality of our society dictates that people must earn a living. It is also unfortunate that there is any expectation for artists to be poor or struggling, for that may discourage some individuals of great talent from artistic pursuits that may contribute significantly to the beauty of the culture. Tom Bradshaw (1994) wrote in a NEA publication entitled *Artists in the Workforce*, that earnings from the arts are lower than those from other professions, and many artists need to work more than one job to remain above poverty level. Bradshaw also noted that it is even more financially difficult for women, as they earn less money (than men) in almost every artist field.

As teachers in training, especially those in the non-traditional age groups, it is possible that the population of the study held their beliefs about availability and ease of finding jobs because they had already made discouraging attempts to work as artists. Because there seems to be no question that society greatly values the arts, it would seem

reasonable that art organizations and art educators work toward a goal of equalizing the status of all areas of creative endeavor, supporting a system of education that gives young people the power to make informed choices about higher education and art careers.

Research Question 3: What are the beliefs of pre-service art teachers about the importance of artists and art teachers knowing how to use technology?

Construct III of the study looked at the beliefs of the pre-service art teachers about the importance of knowing how to use technology. Seventy percent of respondents “agreed” or “strongly agreed” that the technology skills necessary to work in the field of graphic design should be taught in the art department, and 76 percent agreed that art teachers need to know how to teach technology, yet only 3 percent of respondents rated themselves as “expert” computer users. Forty percent self-reported that they were “average” computer users, and 26 percent self-reported to be “more than average.”

Knowing how to use technology, knowing how to teach with technology, and knowing how to teach technology are three distinctly different concepts. Although much can be found in the literature about educational standards and technology, the term most often used is “integration of technology.” This term usually means different things to different people, and in fact, there are numerous ways to integrate technology in a curriculum.

If pre-service art teachers believe, as they indicated in the study, that the technology skills necessary to work in the field of graphic design should be taught in the art department, then it seems reasonable that they should become prepared to teach these skills. However, according to data collected in the study, over half of the respondents had never taken a graphic design course, and three-fourths of the respondents had taken only one or two computer courses throughout high school and college combined.

A study conducted by Brewer (1999) looked at the needs and interests of art teachers for further education. Of 141 participants in this study, the combined percentages of “very interested” and “moderately interested” in the area of studio art was computer graphics (81 percent).

The software used by graphic designers is relatively complex, and its use requires a good understanding of how the basics of technology work. Graphic designers don’t use only one type of software, but usually a combination of page layout, illustration, and image editing programs. In addition, they may use paint, animation, and web page development software. This is a large amount of material for a high school art teacher to teach, especially when combined with the intricacies and management of studio arts such as painting, pottery and sculpture. Therefore, although the pre-service teachers may have the belief that graphic design technology belongs in the high school art program, it is fairly unrealistic to believe that a single teacher would have the ability to do all these things. In addition, time, facilities and technical support all become issues when there is a large number of diverse offerings.

Research Question 4: How do pre-service art teachers rate their expertise and background for using computers/technology?

Study participants were asked four questions that related to this construct. The first question was a self-reported level of technology expertise, and the other three questions asked about numbers of courses taken. Respondents indicated a number of computer courses taken during high school and college, a number of graphic design courses taken, and a number of educational technology courses taken.

According to Hall (2001) “the need for educators who appreciate technology, have knowledge of technology, and are skilled in the art and practice of technology are

required in all levels of the education process if we are to adequately address the issue of technological literacy” (p. 4). A true measurement of technological literacy is difficult to obtain without extensive testing, however the responses to the four questions of this construct served as an indicator of the participants’ experience and knowledge.

Algozzine, Bateman, Flowers, Gretes, Hughes and Lambert (1999) studied methods to infuse technology into faculty and student development activities. It was found that the faculty who prepare professional educators must use systematic efforts to infuse instructional technology in relevant ways in professional education programs.

Further studies, especially targeting pre-service art teachers, could provide information about any differences in how pre-service art teachers perceive the importance of knowing and using technology compared to pre-service teachers in other curriculum fields. The National Art Education Association College & University Chapter Manual (2001) notes that a survey of education employers was conducted to discover factors most important in hiring first year art teachers. It was found that employers evaluate first-time teachers’ academic preparation for knowledge of subject matter, success in student teaching and computer knowledge and skill. Studies that address ways to accurately measure computer knowledge and skill of graduates of teacher education programs need to be on future research agendas.

Research Question 5: How did pre-service art teachers answer the 35 separate items of an objective test about graphic design and related careers?

Some of the 35 objective test questions were general in nature, and may have been answered correctly because the participants already had the knowledge or could use common sense to make an accurate guess. Participants scored fairly low on the more specific questions. and there are several reasons that could account for that fact. First, the

answers to the questions were scattered throughout the multimedia, and it is possible that through the guided navigation participants did not have enough time on a specific area. Also, if it was new information for the participant, it is possible that he could not grasp it in the short time. To more accurately assess whether respondents could learn new information from the multimedia presentation, they would need more time with directed navigation, as well as time to look at the site with self-direction. This would allow participants to spend more time with information they were not familiar with, and also give them freedom to move quickly through information already known. A pre- and post-test would have been a better observation to determine how much respondents actually learned from the multimedia.

Research Question 6: What are the perceptions of pre-service art teachers about the viability of using a web-based interactive multimedia teaching tool as a way to include graphic design in the fine art curriculum?

The web-based interactive multimedia teaching tool that was developed specifically for this study was designed for teachers to be able to use without an in-depth knowledge of computers, specialized software, or significant personal knowledge of the subject of graphic design. Construct IV looked at the viability of using the multimedia as a teaching tool, and participants responded to four questions regarding the multimedia. Sixty-three percent of survey respondents “mildly” or “strongly agreed” that they learned a substantial amount of new information about graphic design from the multimedia. Most of the respondents agreed that they thought high school art students could gain enough information from the multimedia to interest them in further study of graphic design, and they also agreed that they would find the multimedia an easy way to introduce art students to the field of graphic design.

Rosenbaum and Bugental (1998) wrote case histories to demonstrate how usability research can be used to help evaluate the quality of visual communications in navigation, icon recognition, and “look-and-feel.” The small amount of “usability research” available tends to focus primarily on GUIs or Web sites, and so far almost always produces relevant results. The case histories by Rosenbaum and Bugental have strong similarities to the way video games are tested. Test participants are asked to thoroughly use a site, checking navigation flow, ease of navigation, deep movement in and out of the site, and the clarity of menus and submenus.

The multimedia teaching tool (Appendix B) designed for this study has not been thoroughly tested in such a manner. In fact, for the duration of the experiment participants were limited by time and directed navigation control by the researcher. Although participants were invited to return to the site for a period of several weeks following the experiment, this did not happen, which could be due to a number of factors including lack of interest or timing. The experiment was conducted toward the end of fall semester, a time when students are typically thinking about final exams, a break from school, and the holidays.

The multimedia teaching tool has potential for future use and ongoing development. It could be introduced to practicing middle school and high school art teachers, as well as used by career educators. The multimedia could also be used as a CD with an introductory level graphic communications textbook.

The primary goal for the multimedia was to serve as a teaching tool which could be used by art teachers to introduce students to the field of graphic design, as well as the many related careers. Another goal was for the multimedia to be easy to use, requiring

only a computer with an Internet hookup rather than an entire computer lab. The art teacher would not personally have to thoroughly know about graphic design, or how to use or teach graphic software. The multimedia could be projected by a teacher to an entire class, or an individual student could explore the multimedia independently. Either scenario would require a single computer.

According to the Director of the U.S. Department of Education's office of technology, the department considers digital content one of four "pillars" of school technology along with hardware, connectivity, and professional development (Fatemi, 1999). However, as more digital content is developed and becomes available for teachers, much of it remains unused, with large numbers of teachers citing a lack of time and training.

According to most technology experts, lack of training is the primary obstacle inhibiting the use of digital content (Fatemi, 1999). National, state, and art specific educational standards were discussed in Chapter Two, clearly concluding that current standards all reflect the importance of technology integration.

West (1999) suggested that college of education faculties should be leaders in utilizing multimedia technology to promote changes in teaching and learning. However, it was found through surveys of technology use by faculty in pre-service teacher education programs that a minority of faculty was involved in such use. Again, lack of training was cited, along with limited availability of equipment and no clear expectation that faculty incorporate technology into academic activities. Other reasons to not use technology that were found in the West study include lack of funds, doubt about

pedagogical validity of using some of the new technologies, lack of appropriate materials, and absence of clear programmatic goals for the teacher education program as a whole.

The multimedia teaching tool developed for this study had a distinct advantage for its original use over the thousands of titles on the market. The pre-service teachers were shown directly by the designer of the multimedia how it worked, and given time for guided exploration with the designer in attendance to respond to any questions or problems, as well as to point out the highlights. The purchase of a CD for classroom use, either by a teacher or a department head, lacks a similar opportunity for visualization. A CD is relatively small, comes enclosed in a sealed case, and has little visual clue as to the contents. When purchasing classroom materials, a teacher may compare a book to a CD, and opt for the book. A book may be opened and leafed through, giving the teacher a strong indication of the contents. A CD, on the other hand gives very little insight to content. A book on a teacher's shelf or desk can be looked at instantly, while a CD can only be viewed after starting up a computer with a CD-rom drive, inserting the CD into the drive, then navigating to the CD to begin to explore the contents. Perhaps more attention needs to be given to packaging and demonstrating educational CDs to appropriate audiences.

A future study could compare two groups of teachers, both with access to the same CD multimedia teaching tool, along with a book of similar content. The first group would be given the CD in packaging that seeks to convey the look and feel of the content visually, and would be given a demonstration in how to use the teaching tool. The second group would be given the same CD, but in plain, sealed packaging, and no demonstration of use. After a period of time, the amount of use of the CD by each group would be

measured. The amount of book use would also be measured. Although the result of such a study seems to be obvious, such research could reinforce the need for a quick and easy way for teachers to evaluate the contents of a CD.

It is clear that a teacher can evaluate the usefulness of a book more rapidly than the usefulness of a CD. The teaching tool for this study, although web-based, could be burned on a CD. It is likely that the perceived usability of the teaching tool in the study was due to the in-person demonstration by the designer/developer.

Jamie McKenzie (1999) discussed feedback by teachers regarding technology integration. The teachers reported frustration with Internet use for several reasons, including the requirement to purchase subscriptions, services, resources and reference materials. Although teachers were excited in the early years of the Internet, issues of accuracy, reliability, organization and value have disillusioned them. Teachers are facing increasingly demanding schedules, including incorporating standards and rigid testing. An organized clearinghouse of educational CD's and web sites appropriate for classroom integration would be a valuable resource.

Research Question 7: Did pre-service art teachers believe they would need more training to use the multimedia teaching tool?

The participants in the study were split nearly evenly regarding this question. Using the multimedia teaching tool would require that someone be able to turn on a computer, connect to the Internet, and type in the URL for the teaching tool. Although these steps are not difficult, they may be intimidating to a teacher with no computer experience.

Technology will continue to advance at a rapid pace, and there are no signs that there will be less pressure for teachers to use it in the classroom. Schools are investing

more and more of their budget in a continual struggle to acquire and update both hardware and software, as well as retain adequate technical support. But in school, just as out of school, some people use and enjoy using computers, while others simply have no interest, or are perhaps too overwhelmed to take the first steps. The schools that have made significant progress in the technology arena have often done so because individual faculty and/or staff have had the interest, motivation, and personal desire to build a network, build web pages, put courses online, and figure out programming for specific school uses.

Schools are asking, and in some cases even requiring, that all teachers become computer literate. According to Pool (1997), "Digital literacy is the ability to understand information and – more important – to evaluate and integrate information in multiple formats that the computer can deliver" (p. 48). Although educational standards address the issue of technology integration, and teacher training programs are requiring courses in educational technology, the problem continues to persist that some teachers simply resist learning and using technology.

There has been considerable research about best practices for training teachers to use technology. Although it has been established that short duration workshops or seminars are ineffective, it has yet to be concluded what exactly works best to train teachers. Most teachers who do not use technology cite lack of time as a major problem. They need time to learn how to use computers, time to assess technology, and also time to prepare lessons that make use of technology. With time already stretched thin, technology integration is an overwhelming addition to teachers who simply do not have an interest.

Further work would be required to make the multimedia teaching tool about graphic design and related careers fully accessible to teachers who could benefit from it. Simply posting it on the web would probably not reach the intended audience of art teachers and students. A production and dissemination strategy would be required to achieve a substantial level of use.

Quantitative Analysis

Research Question 8: Are there any significant relationships among the seven constructs described in chapter 3: (a) attitudes about where graphic design should be placed in high school curriculum, (b) perceptions about jobs and availability of jobs for artists, (c) beliefs about the importance of artists and art teachers to know how to use technology, (d) computer and/or technology expertise and prior computer courses, (e) knowledge of graphic design, (f) viability of using the multimedia teaching tool, (g) need for further technology training?

The finding that the need for further technology training is related to attitudes of pre-service art teachers about the placement of graphic design in the curriculum, technology expertise and prior computer experience of the pre-service teachers, and their scores on an objective test about graphic design and related careers, suggests that the these constructs may contribute to an understanding of variables that pertain to the study of graphic design and the technology requirements related to such study.

Many studies have been and are currently being conducted regarding technology integration. The International Society for Technology in Education (ISTE), the Center for Applied Research in Educational Technology (CARET), the National Center for Education Statistics, and the Journal of Research on Computing in Education (JRCE) are but a few organizations studying and accumulating data on issues of technology integration.

In the past few years there have been numerous studies dealing with integrating technology in teacher education programs. Most studies cite the same issues in their results: (a) lack of time, (b) lack of training and (c) lack of money. A study by Abbott and Faris (2000) examined the attitudes toward the use of computers by pre-service teachers before and after a course that required the use of technology. Results of this study suggested increases in positive attitudes toward computers as a result of instructional approaches, meaningful assignments requiring technology, and supportive faculty.

Few studies were found that directly looked at pre-service art teachers and technology integration. Future research into pre-service teachers and technology integration should attempt to investigate how the attitudes and beliefs of pre-service art teachers regarding technology compare to other types of pre-service teachers. The NAEA Research Agenda (<http://www.naea-reston.org/programs-research.html>) identifies the implications of technology integration on art instruction as a point for research in the instructional area. Burton (1998) surveyed 332 art educators, with a response rate of 75 (22.6 percent), reporting on a total of 254 studies completed or ongoing in 1995-1996. There were 20 studies (7.9 percent) identified by key words “computers” and “technology.”

Research Question 9: Is there a relationship between age and gender of pre-service art teachers and the seven constructs: (a) attitudes about where graphic design should be placed in high school curriculum, (b) perceptions about jobs and availability of jobs for artists, (c) beliefs about the importance of artists and art teachers to know how to use technology, (d) computer and technology expertise and prior computer courses, (e) knowledge of graphic design, (f) viability of using the multimedia teaching tool, and (g) need for further technology training?

The findings for this research question were not significant, implying that age and gender did not have an effect on the seven constructs.

Conclusions

It is clear that the arts are important to the culture and world society. It is also clear that it is difficult to earn a living as an artist. Although there are certainly notable exceptions, there are far more university graduates with art degrees than there are jobs for artists.

It is during high school that students typically begin the serious consideration of further education and life's work. For students in high school art classes, and especially those who are interested in pursuing further art education and possibly an art career, the high school art teacher plays a key role in communicating to those students what options and possibilities exist.

Grauer (1998) found that the beliefs of pre-service art teachers about appropriate subject matter and the ways it should be taught often took precedence over willingness to acknowledge or accept the values subscribed to in educational literature. Grauer also noted that "the personal beliefs of individual teachers dictate what, or if, art education will take place" (p. 351).

High school art programs typically focus on the traditional content of drawing, painting, pottery, and sculpture. Art teacher preparation programs are generally composed of academic preparation in visual arts content areas, which include studio components, aesthetics, art criticism and art history (Sevigny, 1987). Pre-service teachers also take coursework in theoretical foundations of education, philosophy of art education, curriculum theory, instructional strategies and supervised field experiences. Although pre-service art teachers are exposed to theory, philosophy, and approved curriculum, the

values and beliefs of individual teachers often determine what and how art content is actually taught.

Research has shown that art course content is often the decision of the art teacher, and the teacher most often decides to teach what they like and know best. This model works well at the post secondary level where students have made a decision about their focus area(s), and teachers are specialists in teaching these areas. However, at the high school level it is important for art teachers to equalize and familiarize students with a wide variety of content areas. To best benefit students with an interest in further study of the arts, high school art teachers should teach art foundations that equally include an overview or introduction to all art content, both “fine” and “applied.”

There is an implied line that separates “fine art” from “applied art,” and there is also a subtle yet clear attitude that “fine art” is a higher art form than “applied art.” This is perhaps a carryover from years ago, when applied art was strongly associated with the printing industry. In fact, applied art pieces such as posters, book covers, labels, illustrations and more are printed in multiples of hundreds or thousands, or even hundred thousands, while a piece of fine art, such as a painting, is mostly one of a kind, destined for the wall of a gallery or museum. Another major distinction between fine and applied art is that applied art is created for the market place, it is made to fulfill the needs of a client, while fine art is created for beauty. Applied art is created for monetary gain; it is income for an artist to help increase income for a client. Fine art has a position that implies its integral importance is beyond that of the mere marketplace. Fine art, such as a portrait or other commission, may be created for money, but such art seems to enjoy a higher status than a beautiful poster or book illustration.

High school art teachers should be responsible for explaining “fine” and “applied” art to students, noting the distinctions, but without reference to status. High school art teachers should be able to give their students realistic information about all types of careers for artists. In high school, art students should learn about “being an artist,” not only about “making art.”

The introduction of the Apple Macintosh computer in 1984 caused a major shift in the applied arts, and the computer has become an important tool for all types of designers. As technology advanced, schools have struggled to purchase and maintain computers. “Fine” or studio art programs have been mainly distant from the scramble to have and use technology, as the traditional tools of art are viewed as rather incompatible with computers, which has caused an even further separation between fine and applied arts.

There are many new types of jobs for applied artists as a result of ongoing advances in technology. Art programs and the study of art in school has often been justified by a variety of reasons, but rarely because of its potential for career opportunities. Art curriculum is frequently justified by what it provides to other disciplines and non-related career fields. For example, jobs in business and industry look for “creative thinkers and problem solvers,” a quality that is attributed to study of the arts.

There are numerous job titles for applied artists, including but not limited to animator, illustrator, desktop publisher, corporate designer, advertising designer, video game designer, web designer and packaging designer. Within these specific job titles may be subspecialties, such as medical illustrator, logo designer, art director, creative director, and character designer. Jobs for traditional fine artists include sculptor, painter, and

potter. If high school art teachers understood and could explain to their students all types of jobs associated with the arts, then it would benefit students because they would be able to make a more informed choice about future studies and careers.

Although the stigma of the terms “vocational” and “applied arts” persists, perhaps it is time to set this outdated hierarchy aside. Some of the most exciting careers in history are currently available to students who have studied both art and computer technology. These are students who have received traditional art education in drawing, painting and design, and have also learned to be skillful with technology. These are students who can combine foundations of art and design with computer expertise to enjoy rewarding careers where creative thinking, artistic talent, and technology skills are all genuine assets.

Incorporating applied arts into traditional art curriculum creates a greater workload on art teachers, who already have a tremendous and varied amount of materials to manage. The use of interactive multimedia in art education could benefit teachers in substantial ways. Interactive multimedia is being widely explored in universities across the country, and a consensus is developing that interactive multimedia is effective in terms of learning outcomes and student satisfaction (Aggarwal, 2000). According to Cason (1998), interactive multimedia is highly influential in terms of learning outcomes, specifically in promoting deep meaning and a problem-solving approach to learning.

The interactive multimedia learning environment provides a good level of visualization, as well as an excellent way for students to independently explore and learn about a variety of art content. Introducing pre-service art teachers to the benefits of using

interactive multimedia is probably the best way to incorporate this teaching tool in art programs.

Use and understanding of technology by pre-service art teachers needs further study. The term “integration of technology” means different things to different people, and clarification is necessary. Pre-service art teachers should know the difference between using technology, teaching with technology, and teaching technology. Although technology may not appear to be a good match with art, pre-service teacher programs must orient future art teachers how to use technology in the myriad of ways that could benefit art students to be able to more fully enjoy and understand all forms of art.

Further study should look at art teacher preparation programs, and the way technology is integrated in those programs. University professors of art teacher training programs must be fully aware of and able to teach how technology may be integrated with the arts. Supporters of arts in schools, such as business and community members, should be surveyed to gain current understanding of their perceptions of art and technology.

Most of all, high school students of art should be surveyed to determine their interest in combining art with technology. In a single high school art department students could be learning about how to design video games alongside painting and drawing. Aspiring artists should learn in school about new opportunities in the world of work that may be of interest to them.

The technologies that are currently exciting educators are relatively young, and schools will all explore the newly available opportunities differently. Curriculum content that is related to “applied art” is turning up in a variety of programs. It would be valuable

for art educators to embrace the technology, and strive to use it in the numerous ways it can benefit art education. There is no reason or lessen traditional art curriculum, but there is reason to add art curriculum related to the growing field of visual communications.

There is much work still to be accomplished as technology evolves and continues to alter the educational process. The traditional, or fine arts, must be preserved, yet students must also be given access to the new forms of applied arts. This is happening to some degree in a variety of educational settings, but ideally this content belongs with the arts, for the foundations of design, creativity and artistic talent are intrinsically important to the many new careers available. Future study will be the vehicle for this optimum integration.

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APPENDICES

APPENDIX A
ATTITUDE SURVEY

APPENDIX A
ATTITUDE SURVEY



Participant 00000

For the following statements, please circle the number which best describes your attitudes and perceptions about graphic design.

1=strongly disagree
2=mildly disagree
3=neutral
4=mildly agree
5=strongly agree

- | | |
|---|-------------------------------|
| 1. I believe graphic that graphic design should be taught to high school students as part of the fine arts curriculum. | 1 2 3 4 5 |
| 2. I believe that the subject of graphic design should be taught in a vocational setting rather than a department of fine art. | 1 2 3 4 5 |
| 3. There are many good jobs for artists, especially for those who attain a BFA (Bachelor of Fine Arts) degree at a college or university. | 1 2 3 4 5 |
| 4. Students who receive a BFA (Bachelor of Fine Arts) or MFA (Master of Fine Arts) degree can expect to easily find a job when they graduate. | 1 2 3 4 5 |
| 5. Students of the arts should not have any problem finding a job as an artist if they have considerable artistic talent. | 1 2 3 4 5 |
| 6. The technology skills necessary to work in the field of graphic design should be taught in the art department. | 1 2 3 4 5 |
| 7. Artists do not need to know how to use technology. | 1 2 3 4 5 |
| 8. Art teachers do not need to know how to use technology. | 1 2 3 4 5 |

9. Art teachers do not need to know how to teach technology.
1 2 3 4 5
10. Teacher training programs for secondary art teachers should require all students to take two or more courses in graphic design or computer graphics.
1 2 3 4 5
11. On a scale of 1 – 5, with 5 being an "expert level" please rate your degree of expertise for using computers/technology.
1 2 3 4 5
12. Please circle the number that best represents how many computer courses you have taken either in high school or college.
1 2 3 4 5

Are you a male _____ or female _____?

What is your age? _____

Total number of graphic design (or computer graphics) courses you have taken _____

Total number of educational technology courses you have taken _____

Please name your favorite area of specialization or expertise as an artist

Thank you for participating in
this study.

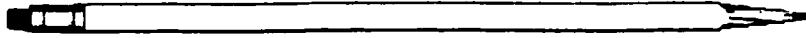
Nancy Stranger
Doctoral Candidate

APPENDIX B
MULTIMEDIA TEACHING TOOL

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graphic design & related careers



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"What is needed is not a definition of meaningful imagery, but the development of our perceptive potentialities to accept and utilize the continual enrichment of visual material."

RICHARD HAMILTON

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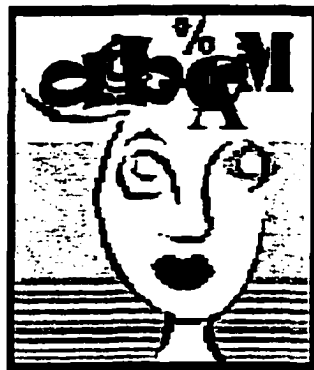
graphic design



Graphic design is "the application of art and communication skills to the needs of business and industry. Graphic design is problem solving for communication." Graphic design is an integral part of our society, playing a key role in the appearance of almost all print, film, and electronic media.

The worldwide market for graphic design services is upwards of \$34 billion, according to James Woudhuysen, Professor of Design Management at DeMontfort University, England.

For each design job the client has unique characteristics, requirements and needs in the creative industry. In the age of ever-changing design, what applies to one designer or company may not fit another, yet all share some commonality. Recent advances in technology have brought about a wealth of new career opportunities to be explored by designers. The goal of clear visual communication remains consistent.



Graphic designers work with images and type to convey a message to an identified audience. Artistic talent and creativity are important in graphic design occupations, as people in this field need strong color sense, an eye for detail, a sense of balance and proportion, and sensitivity to beauty.

IMAGES

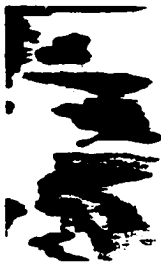
The images used by graphic designers are either illustrations or photographs. Illustration is a specialized area of art that generally uses nonphotographic images, usually representational, to make a visual statement. Illustrations are created for commercial reproduction, generally to enhance a printed piece.

The two basic kinds of photography are cinematography and still. The cinematographer specializes in film, and applies his skills to TV commercials, documentaries, or other commercial projects. The still photographer supplies the graphic designer with the photographs to be reproduced in print. Still photographers tend to specialize in one area, such as advertising, corporate/industrial, photojournalism, public relations, portrait, or fine art photography.

TYPE

The term "typography" refers to the selection and arrangement of type elements included in the proposed design layout for a piece of printing. Skill in typography requires an understanding of type, typefaces, type measurement, and the various formats available for presenting a printed message.

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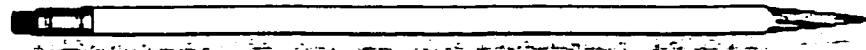
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definitions



Fine or Visual Art

Fine (or visual) art is art produced or intended primarily for beauty rather than utility. Fine arts consist of drawings, paintings, and sculptures that are admired for their beauty.

Computer Art

The set of technologies used to create art with computers. Art or designs created using such technologies.

Graphic Design

Graphic design is the *application of art and communication skills* to the needs of business and industry. Graphic design is problem solving for communication, and is America's most pervasive art form. Graphic design is an integral part of our society, playing a key role in the appearance of almost all print, film, and electronic media.

Illustration

Illustration is a specialized area of art that generally uses nonphotographic images, usually representational, to make a visual statement. Illustrations are created for commercial reproduction, generally to enhance a printed piece.

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There are two basic kinds of photography: cinematography and still. The cinematographer specializes in film, and applies his skills to TV commercials, documentaries, or other commercial projects. The still photographer supplies the graphic designer with the photographs to be reproduced in print. Still photographers tend to specialize in one area, such as advertising, corporate/industrial, photojournalism, public relations, portrait, or fine art photography.

Visual Communication

The visual exchange of thoughts, messages or information. A visual or seen method of communication.

Typography

The term "typography" refers to the selection and arrangement of type elements included in the proposed design layout for a piece of printing. Skill in typography requires an understanding of type, typefaces, type measurement, and the various formats available for presenting a printed message.

Gestalt

How we see and organize visual information into a meaningful whole.

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"Allow me to repeat what I was saying to you here; treat nature in terms of the cylinder, the sphere and the cone, all put in perspective, so that each side of an object, of a plane, moves toward a central point. Lines parallel to the horizon give the breadth...Lines perpendicular to the horizon give the depth..."

PAUL CEZANNE

design elements

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LINE

A line is a mark made by a tool as it is drawn across a surface. Line is the basis of most drawing and painting, consisting of actual marks, drawn with pencil, pen, or brush. Whether a line is actually seen, or simply implied, it is undoubtedly one of the artist's most eloquent tools, enclosing space, suggesting mass or volume, and creating a feeling of movement.

SHAPE

Any area enclosed by a line is usually perceived as a whole entity or "shape," set apart from its surroundings. Shapes can be geometric or organic, symmetrical or asymmetrical. Artists use shape, like line, to express different moods.

COLOR

Color is the most effective of all art elements. Color is what we perceive when our eyes sense light reflected from an object. Artists have used color since prehistoric times, reproducing the natural colors they saw. The colors, or hues of the spectrum, are produced by light rays, while artists' colors come from substances called pigments.

VALUE

Value refers to the range of lightness or darkness of a surface. In the visual arts, value can range from the darkest to the palest tones, or from pure black through shades of gray to pure white. Variations and contrasts in values can be effective whether the artist is working with colors or black and white.

TEXTURE

The surface quality of an object attracts the senses of both touch and sight. Artists often try to duplicate or exaggerate the myriad of textures found in nature.

FORMAT

There are many categories of formats, from magazines to business cards, each with a different function as well as advantages and limitations that must be considered. There are as many different formats as there are ways to shape and fold paper. For each format, the designer must consider the size, shape, and how it will be seen and used.

SPACE

Space depends entirely upon what occupies it. The artist regards space as a challenging arena in which to arrange forms and colors.

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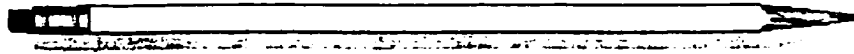
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"Media, by altering the environment, evoke in us unique ratios of sense perceptions. The extension of any one sense alters the way we think and act--the way we perceive the world. When these ratios change, men change."

MARSHALL MCLUHAN

the design process



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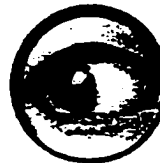
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The best way to learn design is to think like a designer. Learn to continually ask "why" and "how" about the designs you see. Design problems all go through the same basic steps from start to finish.

STEP 1 - Restate the problem in your own words. If you don't understand the assignment or goal, your solution will not be on target. Write the goal or problem on an index card and keep it in front of you as you work on the solution.

STEP 2 - Do any research that needs to be done. Obtain information, illustrations and/or photographs plus any other materials at this stage of the process. Go to the library. Researching the topic will provide many points of departure that might not have occurred at first; this helps with the creative process. Finding visuals that relate to the problem can be very helpful.



STEP 3 - Visualization.

The designer is "brainstorming," and "seeing" in the mind's eye how the layout is going to appear. Visualization gives direction and gets the designer started. Visualization takes an idea or concept and translates it into visual form.

STEP 4 - Thumbnails.

This step is the first for getting something down on paper. Thumbnail sketches are preliminary, small, quick drawings in which the designer tries out different ideas and arrangements of the elements. The goal at this stage is to experiment and decide on the most effective placement of headlines, art, and copy to make an attractive arrangement and to construct a working blueprint for the problem.

STEP 5 - The rough.

The rough layout comes from one of the thumbnail sketches, and is a drawing the actual size of the finished job. All elements are presented fairly clearly and accurately as far as size, style, spacing and placement are concerned. Display type of lettered in and art is sketched in the same size and tone as in the final product; there is enough detail so that the art is a close approximation of its final form. A copy of the original art can be sized, copied and pasted in place on the rough. Text is indicated by a drawn copy block; simulated type, called "greeking," can be used for copy blocks in roughs.

STEP 6 - The comprehensive.

This is the final stage in constructing the design layout, and should look like the real thing. This is a detailed representation of a design, and this step requires careful work. Type, illustrations, photographs, paper stock and

layout are rendered closely enough to the finished product to convey an accurate impression of the printed piece. The "comp" is the solution to the design problem, and must be extremely clean and accurate. Often the comp will be used as a blueprint for the printer.

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"What is needed is a not a definition of meaningful imagery, but the development of our perceptive potentialities to accept and utilize the continual enrichment of visual material."

RICHARD HAMILTON

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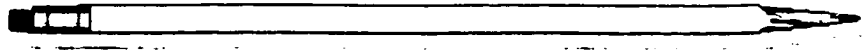
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We live in a visual age. Images in printed communications can improve readability, clarify, attract attention and add realism to what is written. Images can explain complicated information and provide data in an easy-to-understand way. Images can set the mood and help create a pleasing design. Images can be effective in showing a situation, or explaining a situation in sequence.

Images can also be used to establish identity. Graphic designers must know what types of images are available, how to obtain them, and how to process and place them in layouts. Graphic designers must be concerned that the images they use are both effective and affordable. Readers use photographs and graphic images as entry points into a printed page. The audience is the key when it comes to selecting art. Consideration must be given to the sort of art a particular audience will relate to and find appealing. The content of the message is also an important consideration when selecting art. Art comes in two basic forms--illustrations and photographs

Illustration



Although the distinction between *"illustrator"* and *"fine artist"* is somewhat blurred, there is a significant difference. The illustrator generally has to produce work



Photographs

which satisfies a client. The professional illustrator is engaged with drawing or painting for reproduction, generally working for and with others, earning a living from commerce. One of the particular disciplines of a professional illustrator is that creative work has to be done by the demands of the clock. Illustrators can work with any combination of media and techniques to create images.

Photographs can engage readers in a way no other image can. Pictures that are sharp, in focus, have good contrast and good composition can be worth a thousand words. Getting a good photograph is just the first step; their placement, size, and how they are cropped will make a difference to their overall effectiveness. Although graphic designers should have some basic knowledge about photography, it is not generally an area of specialization because it requires special skills.

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typography in graphic design

"ty-pog-ra-phy: n[ML typographia, fr Gk typos impression, cast]: the style, arrangement, or appearance of typeset matter."

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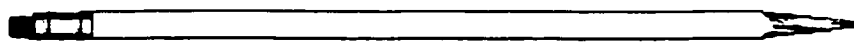
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Typography is sometimes defined as the **"art and procedures for presenting words in a form that can be read by many people."** There are entire books written about using type, and some people spend their lives studying "typography."

▶ **The term typography** refers to the selection and arrangement of type elements in a design. Typographic skill requires a thorough understanding of various types, typefaces, type measurement, and formats available for presenting a printed message. Type is important because it attracts attention, and sets the style and tone of a document. Type influences how readers interpret words, and defines the feeling of a page - usually without the reader recognizing a particular typeface. Type is on the page to serve the text; it should make the words easy to read and provide a suitable background.

▶ **The use of computers in modern type design is essential.** Font manipulation (computer) programs allow users to try to design new fonts, to adjust existing fonts, or to fuse two or more fonts. The Digital Revolution has caused a sharp increase in the number of typefaces in production; just as there was a proliferation of new fonts during the Industrial Revolution at the turn of the last millennium. History tells that there will likely be a return to fine typography in reaction to the temporary reduction of quality and mass creation of novelty fonts. Good, solid, easily readable fonts transcend any of the changing trends and styles in typography.

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsTtUuVvWwXxYyZz

AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPpQqRrSsT

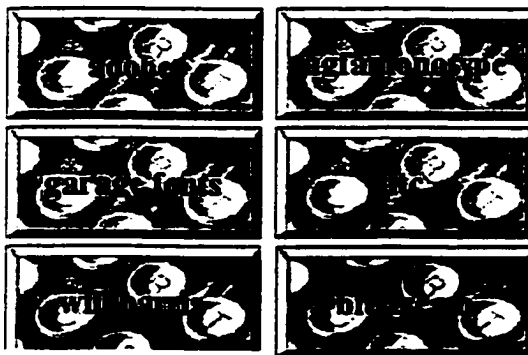
AaBbCcDdEeFfGgHhIiJjKkLlMmNnOoPp

AaBbCcDdEeFfGgHhIiJjKkLlMmN

Typography and printing, the mechanical processes by which the plans of the typographer are realized, are useful arts. Though there is indeed fine typography, typography is not a fine art. The typographer exists not to express his own design preferences, his own aesthetic needs, but to provide a useful (because usable) connection between someone with something to say and someone to say it to.

abcdefghijklmnopqrstuvwxyz

TYPE FOUNDRIES ON THE WEB





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"For the young artist, it's indispensable to live in New York.... in order to succeed... My advice to the young artist is to "become a genius."

LEO CASTELLI

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Graphic design is the art of visual communication; its primary function is to communicate a message or promote a product or service. Many types of workers are needed in the graphic design industry in for print, film, and electronic communications.

The graphic design field is so diverse that most people have difficulty understanding just what careers are available. A good approach is to gain an understanding of the major segments of the industry (such as publishing, advertising and web), and areas of specialization (such as illustration and packaging).

Check the links below for information about career options in this rapidly growing field.

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[Book Design](#)

[Corporate Design](#)

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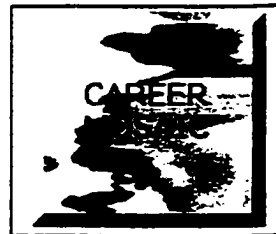
[Type Design](#)

[Video Game Design](#)

[Web Design](#)



Many sites on the Internet have job listings. Some of these sites are huge and cover a broad spectrum of careers (such as [careermosaic.com](#) and [monster.com](#)). These sites are usually organized by types of jobs and geographic location. Other sites are for specific careers. The links below will take you to some sites where you will find information about working in the graphic design industry. Visiting these sites will help you better understand the variety of jobs, the education and skills required to qualify for graphic design jobs, geographic areas where the jobs are concentrated, and average salaries for workers.



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There is no larger mass communications producer than the advertising industry. More than any other discipline, advertising is completely intertwined with American life as advertising is indeed everywhere and on virtually every surface. While television and radio command the largest budgets and address the highest audience share, print is the most obvious of the advertising media.

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advertising design

The fundamental difference between working in advertising and other forms of graphic design is the partnership between copywriter and art director. Together they work on concepts first, and think about execution of the design second.

The graphic elements of an advertisement facilitate quick and easy comprehension of the printed word. They can supply additional information that the written word cannot convey well, and they can help set the desired mood. Images in advertising can show what a product looks like, how a product is used, or the benefits of using the product.

Some of the best talent in the communication field works in the world of advertising. Advertising is a pacesetter in the use of art, type styles, and the arrangement of elements on a printed page. Art can be used in advertising for many different purposes; the most obvious and most frequent is to show what a product looks like, or the benefits of owning and using the product.

Advertising is a part of daily life - it is all around us! Advertising brings commerce, mass media, and design together to create a unique popular art

form. Some of the best talent in the communication field works in the world of advertising. Advertising is a pacesetter in the use of art, type styles, and the arrangement of elements on the printed page. Advertising sells things; it is designed and intended to inform, persuade, provoke, or motivate. Advertising pushes people to buy things, as well as informs about products, services, events and causes, and the benefits of each.

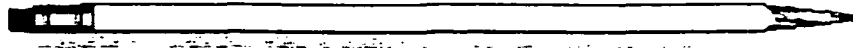
Advertising communication is persuasive communication, and the communicator pays to have the message circulated. The advertising message, or "copy" must be linked with the layout design. In advertising copywriters, account executives, and layout people work together as a team to research the source and its product, the media to be used, and the target audience. The copywriter and the layout artist attempt to integrate the verbal and visual elements that they believe will be the most effective. The goal is to get the desired action (or reaction) out of the target audience in the most effective and least expensive way.

The graphic elements of an advertisement facilitate quick and easy comprehension of the printed word. Advertising is the vehicle the client uses to increase sales, influence voters, promote causes, and obtain contributions. A potential consumer wants a benefit, and an ad should clearly convey one. The client also wants a benefit, for without benefit to the client there is no reason to advertise. Advertising is used in a free market system to promote one brand over another.

	Advertising Education Foundation American Advertising Federation Ad Council	
		Click on the links below to visit top US agencies - Ogilvy & Mather, Dallas - The Integer Group, Denver - TBWA Chiat Day, New York J. Walter Thompson, Atlanta - McCann Erickson Worldwide
		<i>career connections</i>
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animation



Bringing cartoon characters to life through the art of animation is a growing business! Animation is a difficult art form to perfect. The artist needs to see the motion, then try to copy it. Animation is difficult to learn from a book; aspiring animators need to work with experienced instructors. Acme Virtual Training Network (VTN) is a distance learning program that helps train animation students who live far from entertainment and art centers. VTN links animators from Warner Bros. Feature Animation with educational institutions via a video teleconferencing network.

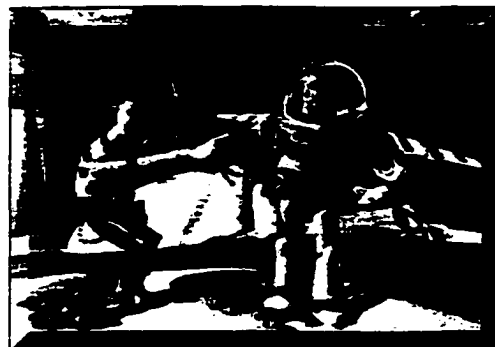


 **GET A FREE
ANIMATION
LESSON FROM
WEB MONKEY!**

One creative and economical use of 3D animation can be evidenced in many of the recently released classically animated features. Backgrounds, camera moves, crowd scenes, and machines of all descriptions have been modeled and animated digitally.



 **READ
ISSUES OF
ANIMATION
FLASH
MAGAZINE!**



Toy Story demonstrated that while computer animation is great for animating geometrical forms, organic materials, such as fabric or fur, are still a challenge for 3D computer animators. © Disney.



Web animations are plentiful. Many page designers grab attention using moving, flashing, spinning and blinking images. Generally speaking, overuse of animation on web pages is considered to be poor design. Various software is available for web animation, requiring a certain level of technical expertise.



Click here
to visit
**ANIMATION
WORLD**

An excellent example of web animation can be found at PixelLight.com. **CHECK IT OUT!**

*career
connections*

Lucas Arts

Animation World
Network

Disney

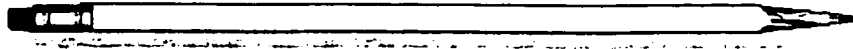
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book design

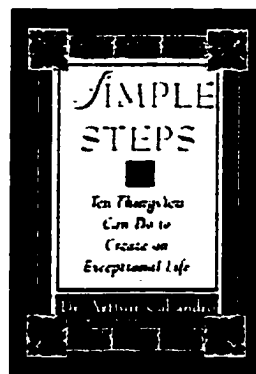
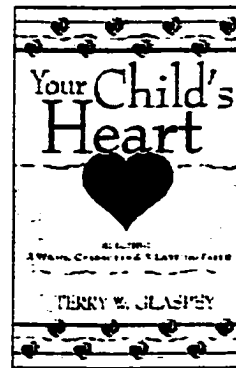


"The book is an extension of the eye...the extension of any one of our senses alters the way we think and act... the way we perceive the world..."

MARSHALL MCLUHAN

Book publishing represents one of the largest employers of graphic designers. Each year approximately 45,000 books are published. While the design of the book itself is generally the responsibility of an in-house designer, book covers are often designed by freelance designers.

Although it is often said that "you can't judge a book by its cover," **it is a fact that the design of a book's cover is what makes that first important impression** about the book for potential readers. A poorly designed, unattractive cover may serve to discourage the reading audience, while a professional, intriguing and attractive cover design.



Readers are accustomed to buying and reading books that employ professional book design to emotionally communicate and support the writer's message. The process of book design - selecting type and ornaments, stylizing headings and paragraphs, front and back matter design, and page layout - is a learned skill that requires a thorough knowledge of book design principals and the printing process. An improperly designed book may be difficult to read or look homemade. Either way, its message might not be taken seriously by readers, and the book may be passed over by buyers, stores, distributors, and reviewers.

Visit some book cover designers by clicking on the links below:

[Watchmaker Publishing](#)

[Resources for children's authors & illustrators](#)

[Hager Design](#)

- [Hermani & Sorrentino Design](#)
- [Book Arts Review](#)
- [Chicago Center for Book & Paper Arts](#)

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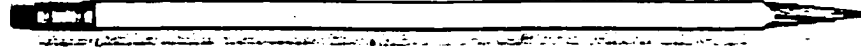
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How does a lone coffee store in Seattle's busy Pike Place market become North America's leading retail coffee purveyor? Starbucks created an ambiance and style that infused "new chic" into this age-old beverage. The Starbucks sensation is driven not just by the quality of its products, but by the entire atmosphere surrounding the purchase of coffee.

corporate design



The great patrons of graphic design traditionally have been found among powerful businesspersons. Multinational corporations have the resources to fund interdisciplinary design and to encourage progressive architecture, industrial, interior, and graphic design. The discipline known as "CI" (corporate identity) began in the early twentieth century in Germany, where architect and industrial and graphic designer Peter Behrens developed the earliest inclusive, coordinated design system for the leading German electrical company. What Behrens did that no designer previously had done was develop a consistent design scheme of standard typefaces, layouts, and colors, the application of which was governed by rules put forth in a design systems manual. This insured a uniform approach to design, regardless of who was designing the individual components of the corporate communications.

The graphic designer who works in the corporate world will see increased use of sophisticated printed communications. Everything from letterheads to annual reports are being produced with a greater focus on type and graphics. In seeking to achieve the corporation's goals, the designer is planning communications that capture attention and pull the reader into and through the entire message.

Graphic design is one of the most powerful tools in creating a professional image for a company. In seeking to achieve the corporation's goals, the designer plans communications that capture attention and pull the reader into and through the entire message.



Corporations and their public relations professionals are turning more and more to graphic designers to produce printed material that is not only attractive, but innovative and memorable as well. The corporate designer seeks to reinforce the image the corporation wishes to create with the use of appropriate visuals. Everything from letterheads to annual reports are being produced with a greater focus on type and graphics.



In 1971, Carolyn Davidson designed the Nike "SWOOSH" for \$35.00

The design, which suggests movement, was selected in haste because of a tight deadline. Phil Knight, the client, said to Davidson "I don't love it, but it will grow on me." Carolyn continued to do design projects for the newly renamed company, Nike, including ads, brochures, posters and catalogs. The company's growth was exponential and the time came when a one-person design shop was too small to handle the advertising needs.

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"The crafts of typesetting, design, and printing have developed a body of knowledge about what works and does not. Electronic publishing has added to that knowledge, and has given many people the tools that were formerly available only to professionals."

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desktop publishing



✕ In 1998 the U.S. Labor Department identified desktop publishing as the seventh fastest growing job for the 1996-2006. The work of the desktop publisher requires considerable basic design knowledge in addition to the skills of keyboarding with speed and accuracy, and using computer hardware and software.

✕ Print graphic design is a mature medium with an understood connection between the author and reader. Structures and systems are established, and deviation from the norm has become expected if work is to challenge and compel. Behind the current technology of "desktop publishing" is a deep tradition of publishing conventions and rules. These rules, standards, and basic criteria for acceptance cover a large body of knowledge, including letter forms, page composition and design, production, and the very ownership of the printed word.

✕ All publishing activities require a fundamental understanding of traditional print production. Preparing text for typesetting, placing text and graphics in an effective design, pasting up and culling for final art, tracking the job through printing and binding, and negotiating with outside contractors are all important issues for a print designer to understand. Throughout the process checking and proofing of documents must be scheduled and implemented for 100% accuracy.

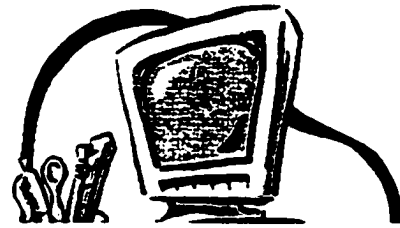
✕ Newspapers, magazines, books, direct mail, posters or outdoor billboards are all forms of print design. The production of these documents will become increasingly digitized, and printing will become a highly educated industry, requiring computer literate personnel trained on the job in the specific software used by a specific company.

- ___ 1. Setup preferences
- ___ 2. Setup tool defaults
- ___ 3. Setup master pages
- ___ 4. Create style sheets
- ___ 5. Setup color palette
- ___ 6. Setup a library
- ___ 7. Design the piece
- ___ 8. Build the document
- ___ 9. Output the document

ABCDEFGHIJKLMNO

✕ Many traditional print shops have gone out of business or been transformed into all digital or partly

digital operations. Service bureaus now function where typesetters, separators, and prepress houses used to be. Many new jobs are available for designers with technology expertise.



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Exhibition design is a hybrid area of design activity, with issues and problems spanning architectural, product, graphic, and multimedia expertise. When substantial numbers of priceless artifacts are involved, daunting security and conservation problems are added to the communication, display, and traffic flow issues.

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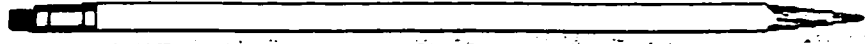
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exhibition design



Exhibits communicate messages in an exciting and memorable manner. A wide variety of media are used to translate the written story into an environment that presents this message. A corporate or trade show exhibit itemizes product benefits, and museums present a body of content.

A museum has the goal of communicating a body of information resulting in motivating the viewer personally, rather than merely to switch products. The museum exhibit, with regular maintenance and major refurbishing every five years, has a life of ten to fifteen years. Museum content is expected to remain constant and change is the result of major discoveries or insightful new interpretations of accepted material.

Corporate exhibits (or trade shows) are typically shown a few times each year for several days at each venue. With annual up-dates it is used for three to five years. The content of the corporate presentation changes with the advertising and marketing position.



Collaboration is usually required in large exhibition design, for it is unlikely that a single designer, or even a single firm would have the range of experience needed to address all the issues in planning and staging exhibitions.

EXHIBIT PROFESSIONAL ORGANIZATIONS

 [Exhibit Designers & Producers Association](#)

 [Trade Show Exhibitor Association](#)

An exhibition is primarily about communication, so it is appropriate for a graphic designer to be the lead designer in exhibition design projects. A design firm may be responsible for the overall planning, design, and implementation of an exhibition, with assistance by a team of experts in other disciplines. The firm may be responsible for scheduling, budgeting, coordination, and hiring subcontractors. The design firm would also be responsible for graphics such as exhibition labeling, identity, logotype, banners and advertising.

Click on the links below to check out resources for exhibition design and building!

[Exhibitbuilder.net](#)

[Freeman Exhibit](#)

[Exhibitor Magazine](#)



[Click here for information about a scholarship opportunity for aspiring exhibit designers!](#)

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In 1995 the Wall Street Journal observed a "sharp rise in TV and film production, creating more jobs, revenues, and opportunities than ever before..."

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film & video design

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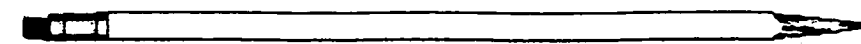
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Over the past five years the changes in special effects technology for film and television have been monumental, causing large shifts and new issues for production companies and the software/hardware companies that service them.

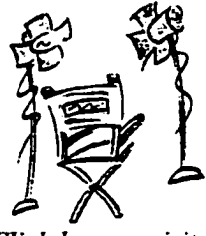
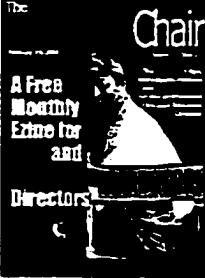
Storyboards are a series of illustrations that tell the action of a story in pictures, often resembling a comic strip. Generally, only complex action or special effects scenes are storyboarded but on certain films every shot in the entire film is drawn. The drawings are frequently tacked to corkboards so that individual drawings can be added or changed in the course of development.

A layout artist works in conjunction with the director to determine what will be in each scene, how each character will look, and how the story can best be broken into scenes. Once this process is complete, the layout artists prepare drawings to guide the background artists and animators.

The background artists are responsible for drawing all of the backgrounds found in the animated movie. A background is considered anything in the scene except for the characters and anything else that those characters might interact with (for example, if a character picks up a book from a table, that book is not part of the background).



P I X A R

 <i>Click here to visit The Cyber Film School!</i>	CINEMATOGRAPHY ART	<i>Free news</i> The Chair A Free Monthly Extra for Directors 
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The art of illustration is multifaceted and requires extensive training as well as artistic ability. Illustration is created for commercial reproduction; otherwise many drawings and paintings done as illustrations look and function as fine art and are exhibited and collected as such.

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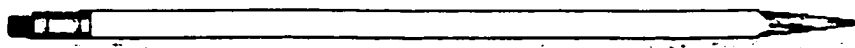
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illustration



Throughout the history of modern illustration there have been men and women who have successfully illustrated but who were never educated as professional illustrators. Despite the ever-changing state of illustration, the professional illustrator is engaged with constants: drawing or painting for reproduction, generally working for and with others and earning a living from commerce.

Making a livelihood out of an ability to perceive an idea visually, together with the skill to realize that idea has ever engaged the artist. An exceptional illustration is demonstrably the work of an original creative mind, allied with the skills of an accomplished draughtsman.

● Illustrators use a wide variety of techniques, such as mixed media collage, cut paper, pen and ink, gouache or other painting mediums, sculptural constructions, and computer-generated work.

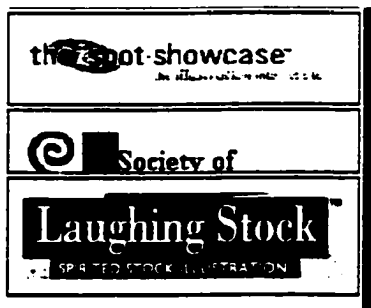
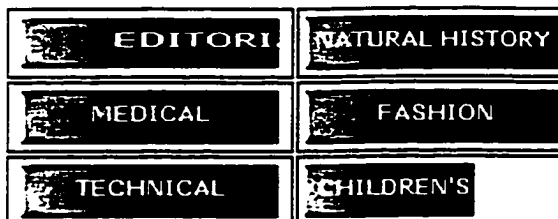
● The role of the professional illustrator is to accompany, explain, decorate, or to expand an idea in a visual way. Illustration is all about the effective communication of ideas using all the techniques and media available to the visual artist.

● The field of illustration has much to offer artists with vision, technical accomplishment and an active appreciation of the world of commerce.

● Illustration is often commissioned by designers, publishers, art editors and art directors. Those who commission illustration are in search of an image that responds to a brief with imagination and accomplishment.

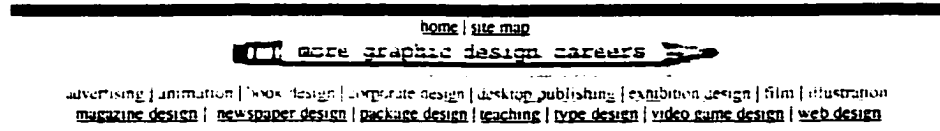


GRAPHIC ARTISTS
GUILD HANDBOOK
PRICING AND
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A career in illustration is not a portfolio of images. It is the day-to-day process of working for clients and expressing ideas in ways that illuminate.







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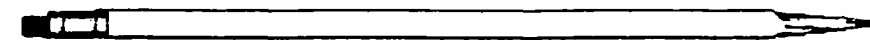
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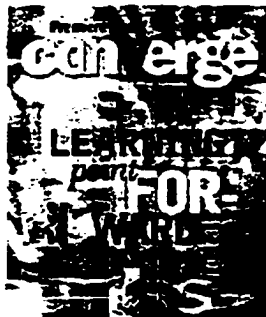
magazine design



There are over ten thousand magazines published in the United States every month, covering every conceivable subject. Magazines can be broken down into three general categories: consumer, business and farm. Most people are familiar with only the consumer group, which includes such magazines as *TIME*, *Vogue*, *Reader's Digest* and *Sports Illustrated*. This consumer group is by far the most visible, but certainly not the largest.

WHO'S WHO IN MAGAZINE PUBLISHING

Most consumer magazines are published in the major cities, especially New York, while business and farm magazines are produced across the country. Business publications, designed to serve various industries, trade groups, and professions, constitute the largest group.



The department of most interest to the magazine designer is the editorial department. The head of this department is the editor; who may also be called the editor-in-chief or executive editor. Reporting to the editor are a number of people responsible for putting the magazine together. There is the managing editor, who makes sure everything is done within budget and on schedule. Associate editors, assistant editors, and editorial assistants help put the magazine together. The designer usually reports to the editor.



The art director of a magazine works very closely with the editor, who is responsible for the articles chosen as well as the look of the magazine.

The art director has the primary responsibility for the creative aspects of producing the magazine.

The art director and editor together determine just how the individual articles should appear and which elements should be given emphasis. This is usually accomplished with thumbnail sketches or rough layouts.

The art director should be versed in all the visual aspects of printed communication, especially type selection and arrangement for effective readability, legibility, and suitability.

MAGAZINE DESIGN

Designing a magazine involves working with type, illustrations, and page layouts. Magazines must have a sense of continuity from issue to issue. Each article in a magazine is treated independently, and the design and illustration reflect the nature of the article. Magazine design is one of the most interesting and challenging areas of the field of printed communications.

Good magazine design must add to and illuminate the content. Working with photographers, illustrators and writers to solve visual problems is an important aspect of the art director's job.

November Issue



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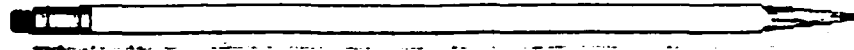
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designing for newspapers

"Most important to the survival and growth of the newspaper industry is the involvement of large newspaper companies in other media."

Leonard Mogel, author of *The Newspaper: Everything You Need to Know to Make it in the Newspaper Business*



This is the age of graphics in newsrooms across the country. More and more advertisements are appearing in the help-wanted columns of newspaper trade publications seeking young people with visual communication skills and an understanding of the newspaper profession.

Design is a vital part of producing the more than 1,700 daily and 9,000 weekly newspapers in the US and Canada.



The design and layout of a newspaper help it achieve four specific goals:

- Increase readability and attract the reader.
- Sort the contents so the reader knows at a glance which information is the most important and what each part of the newspaper contains.
- Create an attractive and interesting package of pages.
- Create recognition so the paper can be readily identified.

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Packaging is a specialized area of the graphic design profession. Package design has a strong impact on consumers. An attractive package on display motivates a consumer to pick it up. The package is often what moves the consumer to purchase a product, at least once! A well-designed package can make an inexpensive product look expensive. Packaging must be functional as well as decorative... it encloses a product, and is usually displayed on shelves where consumers are drawn to the cumulative effect of multiple packages.

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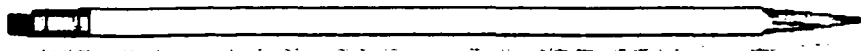
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package design

Packaging is a three-dimensional design discipline, and the designer must give careful consideration to all surfaces throughout the design process. Package designers must be familiar with a variety of materials and their qualities, like glass, plastic, cardboard, paper and metal. They must also know about manufacturing, display, recycling, package regulations, and printing technologies.



All varieties of Kodak film come in distinctive gold packaging.



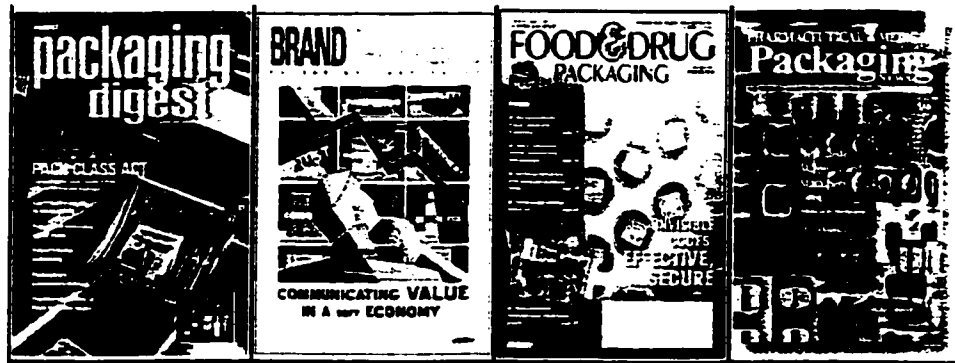
The size and shape of a Giorgio perfume bottle conveys a sense of richness and elegance.



Gateway computers come in distinctive "cow" boxes. Multiples of these boxes stacked in a retail store make an eye-catching display.

Students Packaging Lounge





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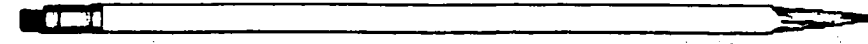
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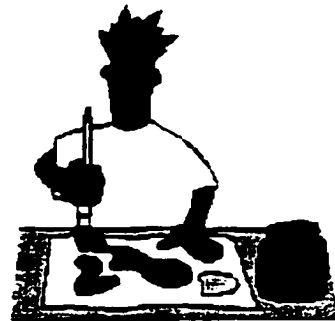
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teaching design



"Art is a deliberate recreation of a new and special reality that grows from your response to life. It cannot be copied, it must be created."

- Anonymous



The Getty Information Institute and the Getty Institute for the Arts are two important resources for art educators seeking to utilize web information. These institute work with organizations around the world to make information about the arts and culture available online for education. The Getty Institutes make extensive use of the Internet's interactive potential to create online communities for those interested in arts and humanities education.

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type designer



TYPEFACE DESIGN is a pure form of graphics, and one of the most difficult in which to excel.

TYPOGRAPHY is an art. It is also an extension of the creative idea. Without proper execution of type, the idea is only a concept. Type can make it come to life. It embellishes the concept visually, adding attitude, style, and feeling.

THE EVOLUTION OF THE ALPHABET is rooted in prehistoric time, as the habits of cavemen developed an early form of visual communication. This form of communication was developed to record stories and ideas, and first dated around 25,000 B.C.

EARLY TYPE DESIGN imitated the pen-drawn style of scribes. The Gutenberg Bible was the first book to be printed from movable type, an invention that changed the world. The design of new typefaces was accompanied by improvements in printing presses, papers and inks. Type designers were influential in shaping the printed word, and many thousands of typeface styles still in use today reflect the originality, artistry and craftsmanship of early type designers.

THE DEVELOPMENT OF PHOTOTYPESETTING in the mid 1950's eliminated many restrictions in the typesetting process, which had a major effect on typographic design.

DIGITAL TYPESETTING brought new capabilities, and in 1985 the introduction of the Apple Macintosh computer irreversibly altered the world by bringing together type, images, and layout design.



BEFORE THE MACINTOSH COMPUTER, A "FONT" was a collection of metal characters representing the complete character set of a particular type design. Today, a "font" refers to the complete set of a particular type design or typeface in digital form.

MODERN TYPE DESIGNERS use computer software specifically designed to create fonts. Designing new fonts is a major undertaking. A new font can be created by modifying an existing font, digitizing existing artwork with a scanner and tracing the image, creating characters from scratch on the screen, or creating artwork using graphic software. After the designer has utilized one of these methods, the images are imported into a font editor. Designing a typeface on a computer takes a high degree of skill using PostScript drawing tools.

TYPEFACE DESIGNERS can take months, sometimes years to develop a new design. The personal computer democratized the manufacture, distribution and usage of fonts. For the first time in history, it is the users who must purchase fonts because they have been empowered with the ability to set their own type.

TYPE ATTRACTS ATTENTION, and sets the style and tone of a document. Type is like "personality on paper." Different typefaces can be casual or formal, silly or serious, old-fashioned to modern. Type can reinforce the image of a company or an individual. The right typeface can encourage people to read a

Pol
holy
night

message, while the wrong typeface, or bad typography, can make a message go unread.

ESSEX

Script Tip
Number Two

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*"Everyone who has a computer
fancies himself a game designer, just
as everyone with a guitar wants to be
a rock star. There is nothing wrong
with that if you remember the
success is a long, hard road."*

DAVID CRANE, Game Designer

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video game design

A game is a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in the pursuit of a goal. The \$5.5 billion a year video game industry churns out 2,000 new game titles annually, requiring thousands of workers with a wide variety of skills.

The importance of art and design in game design cannot be overestimated. Strong graphic design immerses the player in the game. Testing has shown that it is the art that initially draws people to games, and then as they begin to play they become captivated by the characters, which then leads to interest in the content.

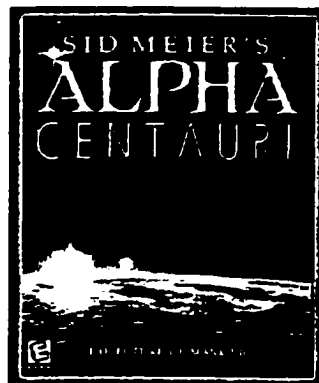
While traditional art forms play to a passive audience, games require active participation. A game is a form of art in which participants, termed players, make decisions in order to manage resources through game tokens in the pursuit of a goal.

A successful game involves a delicate blend of hundreds of factors (art, programming, production, psychology, etc.). Design is the place where all these things must meet to form a coherent whole. Striking this balance is the designer's task. Frequently the main factor in making good design decisions comes down to looking at the problem in the right way; with the appropriate metrics; through the most relevant metaphor; with the correct "tools".



In the late 70's and early 80's, independent game development was limited to high-tech college campuses like MIT and Berkeley, or to the basement of a remote independent designer. In the 90s the Internet brought underground titles to the surface, giving isolated programmers and designers the whole world as their audience.

The ultimate validation of the independent game scene occurred in 1999 when the Game Developer Conference presented the 1st Annual GDC Independent Games Festival. Suddenly it was publicly acknowledged that game development wasn't a hobby - it was an art!



Game designer Sid Meier is famous in the game world. Sid has been around a long time, and his games are phenomenally successful. Civilization and its sequels are a testament to his success. Visit the [CIVILIZATION FANATICS CENTER](#).

GAME SPOT

DEVELOPERS CONF.

GAME MAGAZINE

IGDA

DigiPen was established by Claude Comair in 1988 in Vancouver. In 1994 DigiPen officially accepted its first class of video game programming students into the School of Applied Computer Graphics. The two year video game programming diploma course, offered in cooperation with Nintendo of America, was the first of its kind in North America.

Getting a job in the world of game design is a competitive business. Large companies with human resource departments usually file entry-level resumes without college degrees in the trash. Game companies are looking for designers with four year college degrees and a strong background in art, programming, animation, creative writing, photography and filmmaking.

CAREER *connections*

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web design

The relatively new field of web design requires a design team which includes workers who can handle information architecture, HTML code, and graphics. Because the web is about information and often used for marketing, the web designer must keep the goals of a client firmly in mind! The web offers the opportunity to explore a client's goals in the context of color, sound and movement, rather than simply the single dimension offered by print communications.

Because the web is a highly technical medium, designers must be familiar with technological parameters and potentials involved in making sites or CD-ROM interfaces. While it is true that print designers must understand prepress and printing limitations, a print designer can actually make do without ever seeing the inside of a press room. The web designer, however, must work directly with the technology to achieve results! While the Web and CD designer does not have to be fluent in programming code, it is useful to be able to converse in the language, if only to ensure that designer and programmer are on the same track.



Within the web and CD ROM job market, the possibilities are vast. The World Wide Web is the fastest growing medium on earth. All the major mass media corporations -- newspapers, magazines, television, and book publishers -- have Web site divisions, with online content being taken directly from newspaper or television programming.



Virtually all businesses and nonprofit institutions have dedicated Web sites, which means that many design studios are engaged in designing and maintaining them. Although many sites are designed by freelancers or design consultancies, in-house staffs are employed where they never existed before. Businesses with small sites usually rely on freelancers to revise and update them regularly, but building and maintaining successful web sites for large corporations may require the efforts of 40 full time workers. Although some sites are primarily informational, others are designed to engage the consumer/viewer/reader in specific activities and offerings (the **Coca-Cola Company** is an outstanding example). Web design requires intense collaboration as web designers must work with writers, producers, programmers and technicians.

career connections

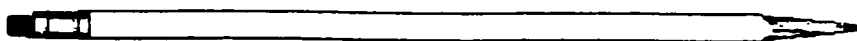
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history of graphic design

"Art is human intelligence playing over the natural scene, ingeniously affecting it toward the fulfillment of human purposes."

ARISTOTLE



The birth of graphic design

can be traced back 30,000 years to cave painting, or about 550 years to Gutenberg's invention of the printing press. The Industrial Revolution brought major growth in graphic design due to the interest in providing information to the entire culture rather than only to the affluent elite. The growth of population centers, industry, and a money-based economy all increased the need for the dissemination of information. Advertising flourished during this time, and great strides were made in printing.

The accelerating revolution in graphics technology that began in the 1960s with phototypesetting and xerography, went digital with electronic page-makeup and laser scanning is providing ever more powerful tools for the creation and manipulation of text and image. Also, because of the economics of microchip mass production, these tools are accessible to all designers. After 450 years of manual printing, the rapid development of new typesetting and press technology caused a major shift in work patterns in the graphic design industry.

The term graphic design was first coined during the early part of the century and referred to images that were written, printed, or engraved.

The engraving, etching and woodcut processes allowed the reproduction of hundreds, or even thousands, of copies of a single piece of art. These print images became best-selling items in color and in black and white. Printmakers sold portraits of kings and other famous people. They sold replicas of famous paintings. Print shops were filled with the images of fantastic landscapes and exotic animals from far-off lands.

Engraving and etching were also used for another method of printing known as intaglio. This technique was the major source of printmaking for fine art.

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"The making of a work of art may be a treasure hunt in which the seeker understands what he is looking for only when the job is done. The essence of creation lies in the recognition of beauty when it occurs. Picasso said, "I do not seek, I find..." I believe that the way to learn about where one is as a creative person is to be involved with life..."

LIPPOLD

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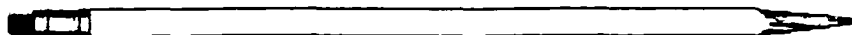
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education



The professional graphic designer

must possess a wide range of skills and knowledge, including the ability to analyze problems, represent and solve them visually, and specify printing techniques and materials for successful reproduction. Whether a student decides upon a dedicated art school, or a state or private university art department, the important components of graphic design education include history, theory, concept, computer use in graphic design, image-making and typography. Also, a comprehensive graphic design education should include studies about the business of graphic design, and the development of a professional portfolio. The American Institute of Graphic Arts (AIGA) lists 240 four-year programs, and 1300 to 2500 two-year programs in graphic design. You can visit many of these schools through this [comprehensive list](#), or click on individual schools below to see differences between two and four year programs.



community colleges

Colorado Mountain College
Glenwood Springs, CO

James Sprunt Community College -
Keenansville, NC

universities

Georgia State University
Atlanta, GA

San Diego State University
San Diego, CA

University of Washington
Seattle, Washington

Northern Michigan University
Marquette, MI

art schools

Art Center College of Design -
Pasadena, CA

[Rhode Island School of Design -
Providence, RI](#)

[Ringling School of Art & Design
Florida](#)

Rocky Mountain College of Art and
Design -
Denver, CO

trade/technical schools

Al Collins Graphic Design School -
Tempe, AZ

Platt College
Aurora, CO

online graphic design education

<http://www.sessions.edu>

<http://www.aionline.edu>

graduate schools

Pratt Institute
Brooklyn, New York

[Rochester Institute of Technology
Rochester, NY](#)

Miami Ad School:
Miami, FL

<http://www.about.com>

Ohio State University
Columbus, OH

FullSail Reg: World Education
Orlando, Florida

<http://www.design-l.org>

<http://www.gnomononline.com>

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links for graphic designers

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Graphic designers can learn the following by studying the work of masters:

- ① understanding how to analyze any given design problem
- ② understanding how to analyze who your message is intended for
- ③ understanding how to apply simple design rules
- ④ sensitizing vision to see and recognize when good design is achieved
- ⑤ many, many, many, many, many design exercises, trials and errors.

National Design Museum

International Design Conference

American Center for Design

The Idea Exchange

The Metropolitan Museum

The Design & Publishing Center

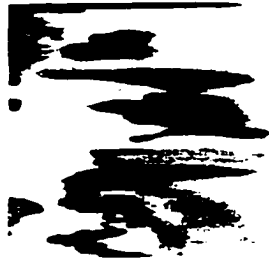
Designers Bookstore

The Design Museum

IPPA

The Arts Edge

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links for art educators

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Art Educators

- ②
- ② understanding how to analyze who your message is intended for
- ② understanding how to apply simple design rules
- ② sensitizing vision to see and recognize when good design is achieved
- ② many, many, many, many, many design exercises, trials and errors.

Assoc. for the Advancement
of Art Education

The Incredible Art Department

Art Schools.com

National Art Education Assoc.

Federal Resources for
Educational Excellence

US Department of Education

Weekly Art News

Art Cyclopedia

Teaching jobs

Colorado Art Education Assoc.

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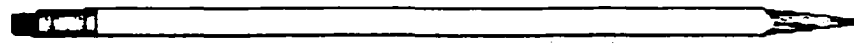
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professional organizations



Membership in professional organizations is important for graphic designers. Participation in organizations can help a designer develop and understand relationships with clients, employees, and suppliers, as well as keep up to date on industry trends, fees, contracts, insurance, marketing and copyright laws.

Professional memberships can stimulate thinking about design within the creative community. Participation can stimulate thinking about design among the media, the business community and the public by illuminating the challenges of the design process, the role of the designer and the value of effective design.



AIGA Colorado

Art Directors Club
of Denver

Graphic Arts Technical
Foundation

International Council of
Graphic Design Assoc.

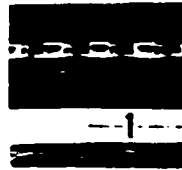
AIGA

Graphic Arts Guild

American Center for Design

GAIN

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professional publications

Professional publications are important sources of information for graphic designers. Numerous design publications can be found on the web ("e-zines"); many include full text articles. Publications which focus on the technology used in graphic arts are particularly important for designers who desire to keep up with industry trends, as well as keep their skills updated.

	 Eyewire 	 Eclipse e-zine 
	 Letter Arts Review 	 Communication Arts 
	 CMYK Magazine 	 Graphic Arts Monthly 
	 Mac Design Online 	 Step by Step 
	 BS Digital Design 	 HOW Magazine 
	 Dynamic Graphics 	 Publish 
	 PRINT 	 Serif Magazine 

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APPENDIX C
STORYBOARD FOR MULTIMEDIA TEACHING TOOL

Nancy Strunger
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

- Introduction
- Definitions
- Brief history

Nancy Strunger
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

•Introduction
•Definitions
•Brief history

Modern graphic design offers more industries using a broader range of media than ever before.

Nancy Strunger
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

•Introduction
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•Brief history

More than any other visual culture, graphic design is inescapable.

Henry Manguerra
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part One

- *Introduction
- *Lectures
- *Brief history

Each day we negotiate a huge quantity of graphic images

- *From periodicals to enticingly packaged products...

Henry Manguerra
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part One

- *Introduction
- *Lectures
- *Brief history

From bus schedules to eye-catching advertising

Henry Manguerra
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part One

- *Introduction
- *Lectures
- *Brief history

From books and records to opening credits on television

Nancy M. Wenger
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part One
 • Introduction
 • Outcomes
 • Brief history

• From corporate identity to cartoons

Nancy M. Wenger
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part One
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Graphic design is the art of visualizing ideas.

Nancy M. Wenger
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

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 • Outcomes
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Graphic design employs type and images to clarify information.

Nancy Stricker
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

- *Introduction
- *Outcomes
- *Brief history

Graphic design is basic communication by creative problem-solving

Nancy Stricker
Associate Professor of Graphic Design
Graphic Design and Related Careers
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- *Brief history

Graphic design is the use of words and images on more or less everything.
more or less everywhere

Nancy Stricker
Associate Professor of Graphic Design
Graphic Design and Related Careers
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Part One

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Graphic design is the creation of design solutions that

- *educate
- *communicate
- *motivate
- *entertain
- *sell

Henry Strater
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

- Introduction
- Classroom
- Visual History

(Pictographs here as example of early graphic design)

Henry Strater
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

- Introduction
- Classroom
- Visual History

Some historians claim that the origins of the term "graphic design" are in confusion and dispute, although it is known that it was being used in America in 1922 to refer to certain areas of advertising.

Henry Strater
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

- Introduction
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- Visual History

Others credit the term "graphic design" to W. A. Dwiggins in 1922. Dwiggins was a letterer, calligrapher, and type, book, and advertising designer as well as a novelist, playwright, and marionette theater impresario.

Nancy Murriger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part One
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The term "commercial art" was more widely used during the 1920's, however both terms were used interchangeably for many years.

Nancy Murriger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part One
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During the 1930's graphic designers were involved in package and product design

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 Graphic Design and Related Careers
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In the 1930's graphic designers who engaged in industrial design called themselves "designers for industry"

Harry Morgan
Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

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In the 1950's graphic designers were making an effort to expand and legitimize graphic design in the international business world.

Harry Morgan
Associate Professor of Graphic Design

Graphic Design and Related Careers
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Designers during this time period were calling themselves by a variety of names.

- Visual communicator
- Visual designer
- Graphic communicator
- Communications specialist
- Communications consultant

Harry Morgan
Associate Professor of Graphic Design

Graphic Design and Related Careers
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In 1959 Masaru Katsumi made a distinction between terms in a Japanese magazine called Graphic Design.

Katsumi claimed that "graphic design" was an industrial process, while "commercial art" was associated with hand-drawn illustration.

Nancy Munnery
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part One

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More brief history in following slides... Up to present.

Nancy Munnery
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Two

- Images
- Type

Nancy Munnery
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Two

- Images
- Type

Words in graphic design play a key role in communicating the message to an audience.

Visual Strategy
Strategic Placement of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Two

- Images
- Type

Words communicate through their content and their appearance

Visual Strategy
Strategic Placement of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Two

- Images
- Type

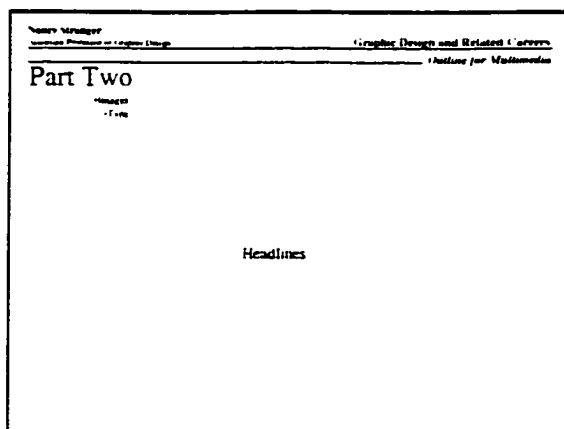
The size and treatment of words show readers the level of importance, and what should be read first

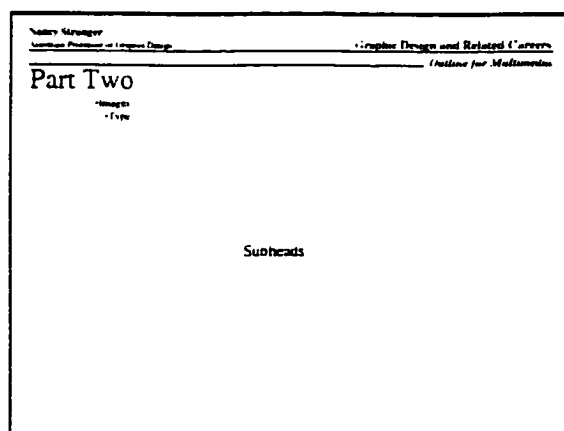
Visual Strategy
Strategic Placement of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

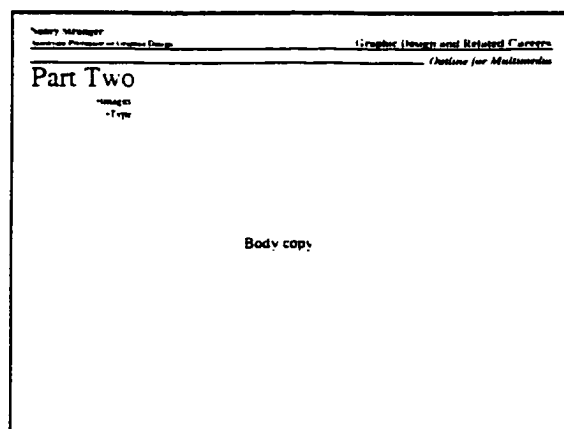
Part Two

- Images
- Type

The type face and typestyle can tell readers the tone or mood of the communication before they actually read it







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Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part Two

Images
• Type

Captions

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Associate Professor of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part Two

Images
• Type

Titles

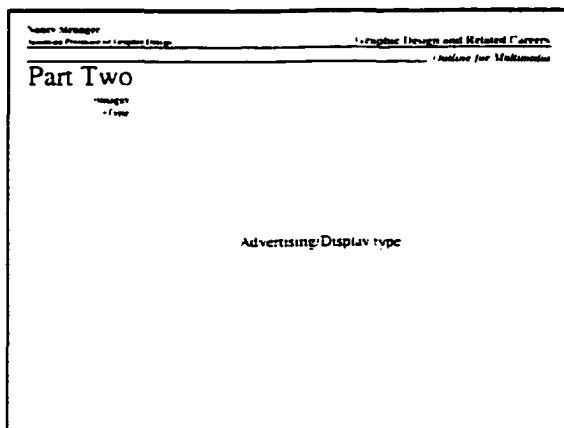
Nancy M. Wenger
Associate Professor of Graphic Design

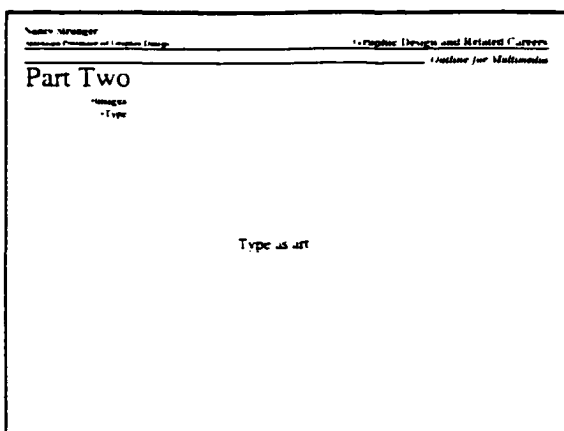
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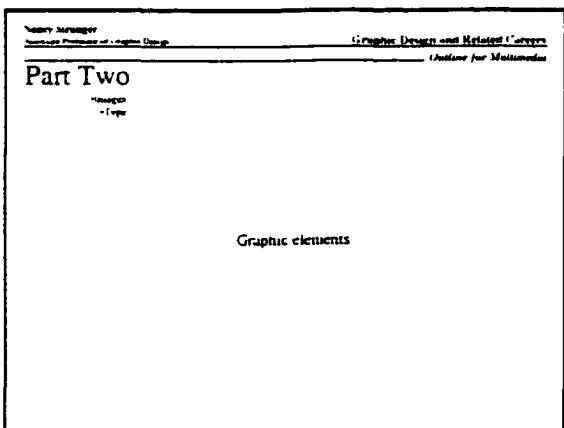
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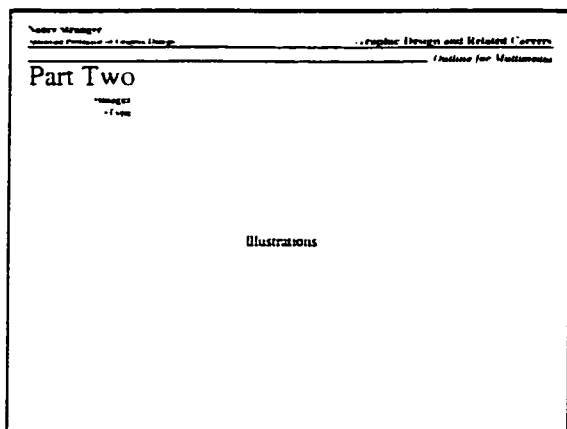
Images
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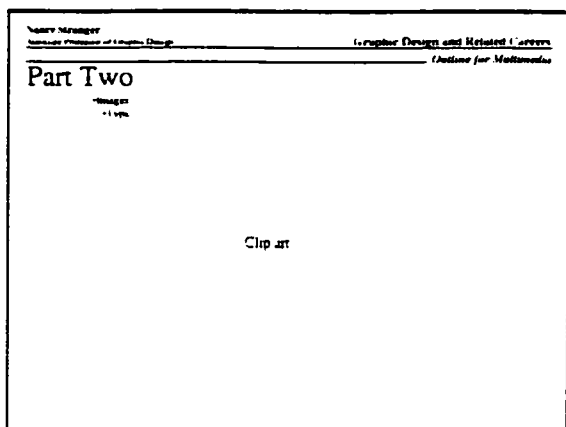
Publication type

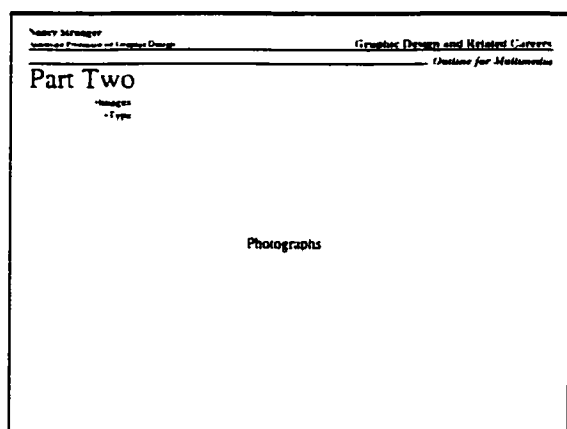












Nancy Munnery
Assistant Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Two

Images
• 1.1.10

Deciding whether to use
illustrations or photographs

Nancy Munnery
Assistant Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Three

- Similarities between graphic design and fine art
- The difference between graphic design and "computer art"
- The design elements and their importance in graphic design

Nancy Munnery
Assistant Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Four

- Jobs and careers for graphic designers
- Salaries for graphic designers

Nancy Metzger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Four

• Info and careers for
 graphic designers
 • Careers for
 graphic designers

Job titles for workers in the graphic design industry are widely varied.

- Some are general classifications
- Others are specific job titles

Nancy Metzger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Four

• Info and careers for
 graphic designers
 • Careers for
 graphic designers

Some general work classifications are:

- Graphic designer
- Graphic artist
- Commercial artist
- Designer

Nancy Metzger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Four

• Info and careers for
 graphic designers
 • Careers for
 graphic designers

Some specific job titles are

- Advertising artist
- Web graphic designer
- Desktop publisher
- Creative director
- Art director
- Multimedia designer
- Illustrator

Nancy M. Wenger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
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Part Four
 Jobs and careers for
 graphic designers
 *Related to
 graphic designers

•Advertising artist

Nancy M. Wenger
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
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Part Four
 Jobs and careers for
 graphic designers
 *Related to
 graphic designers

•Web graphic designer

Nancy M. Wenger
 Associate Professor of Graphic Design
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 Jobs and careers for
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 *Related to
 graphic designers

•Desktop publisher

Senior Manager
Senior Producer of Graphic Design

Graphic Design and Related Careers
Outline for Multimedia

Part Four
*role and career for graphic designers
*outline for graphic designers

•Creative director

Senior Manager
Senior Producer of Graphic Design

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*role and career for graphic designers
*outline for graphic designers

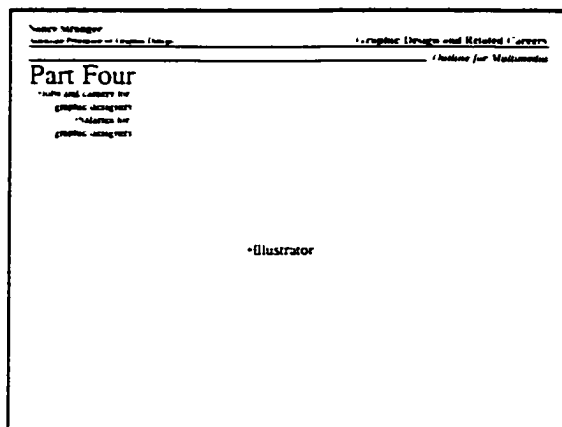
•Art director

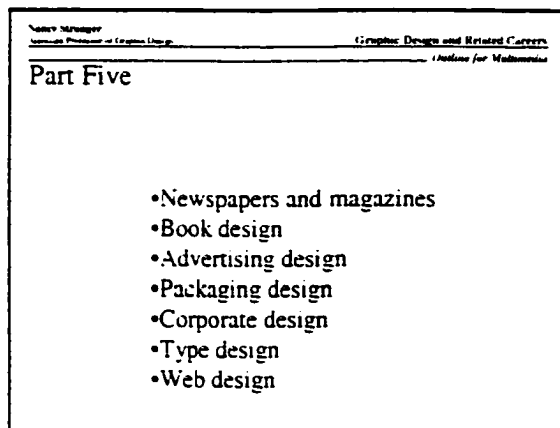
Senior Manager
Senior Producer of Graphic Design

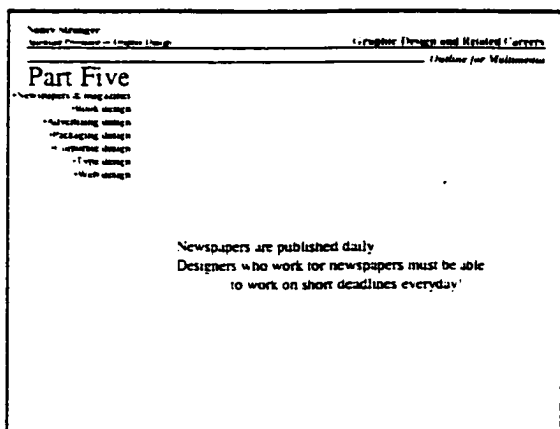
Graphic Design and Related Careers
Outline for Multimedia

Part Four
*role and career for graphic designers
*outline for graphic designers

•Multimedia designer







Student Manager
 Assistant Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

Newspapers & magazines

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Designers who work for newspapers will probably do some typesetting, advertising design, page layout design, and other miscellaneous duties. Although newspaper work is generally not considered to be the most creative for designers, it is excellent experience

Student Manager
 Assistant Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

Newspapers & magazines

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

There are thousands of magazines published in the United States every year

Student Manager
 Assistant Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

Newspapers & magazines

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Magazine designers work with type, illustrations and page layout. These designers generally work in the editorial department.

There can be several levels of designers. In addition, there is often a promotion manager and a production manager

Student Manager
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- Newspapers & Magazines
 - Book design
 - Advertising design
 - Packaging design
 - Corporate design
 - Type design
 - Web design

Book publishing represents one of the largest employers of graphic designers. Although books are published during spring/summer or fall/winter, book design and production continues throughout the year.

Student Manager
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- Newspapers & Magazines
 - Book design
 - Advertising design
 - Packaging design
 - Corporate design
 - Type design
 - Web design

Book designers are responsible for taking the manuscript and illustrations and making them fit the publisher's specifications.

Student Manager
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- Newspapers & Magazines
 - Book design
 - Advertising design
 - Packaging design
 - Corporate design
 - Type design
 - Web design

Book jackets, or dust covers, are often designed by freelance designers. A book jacket designer concentrates on creating a design that will attract attention.

Nancy Strasser
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

• Newspaper & magazine

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Advertising design is for those who are talented, creative and into making money.

Nancy Strasser
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

• Newspaper & magazine

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Advertising is fast-paced and dynamic. The two main categories of advertising are

- Print
- Broadcast (TV and radio)

Nancy Strasser
 Associate Professor of Graphic Design
 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

• Newspaper & magazine

- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Advertising agencies have several levels in their creative departments.

- Account executive
- Creative director
- Art director
- Copywriter
- Rendering artist
- Type director
- Mechanical artist
- Art buyer
- Print producer

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 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- New concepts & design ideas
- Brand identity
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Packaging can be divided into three major categories:

- Industrial
- Consumer
- Promotional

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 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- New concepts & design ideas
- Brand identity
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Consumer packaging includes these categories:

- Food and beverage
- Cosmetics
- Pharmaceuticals
- Household products
- Sports and recreation
- Personal
- Automotive

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 Graphic Design and Related Careers
 Outline for Multimedia

Part Five

- New concepts & design ideas
- Brand identity
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Good packaging can be a powerful marketing tool

Nancy M. Morgan
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Five

- Newspaper & magazine
- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

Package design is three dimensional design
 and involves complex design problem solving skills

Nancy M. Morgan
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

Part Five

- Newspaper & magazine
- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

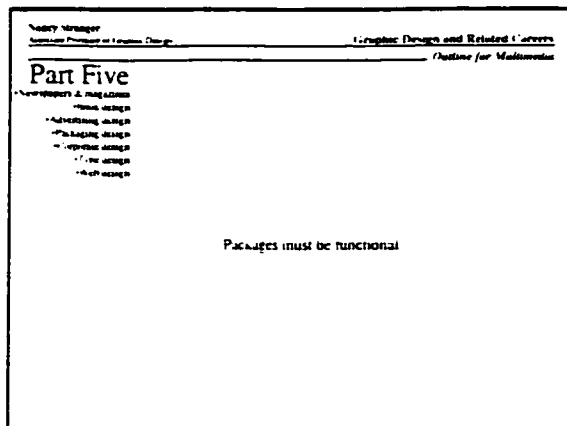
Packages must be attractive in all sizes and from all angles

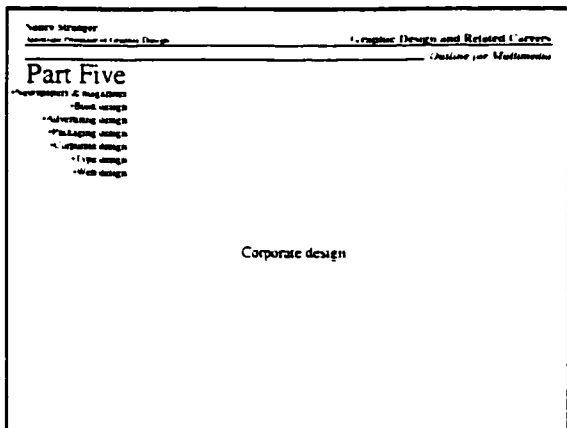
Nancy M. Morgan
Associate Professor of Graphic Design
Graphic Design and Related Careers
Outline for Multimedia

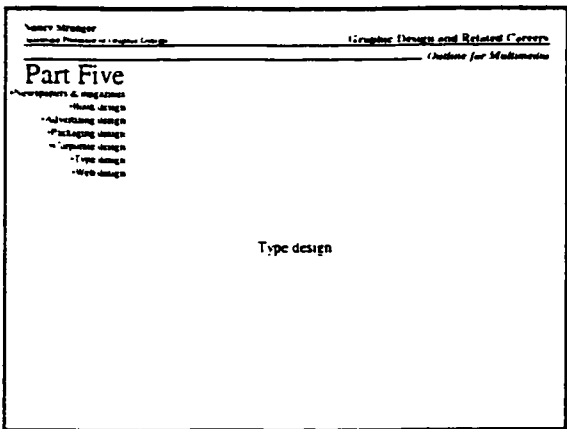
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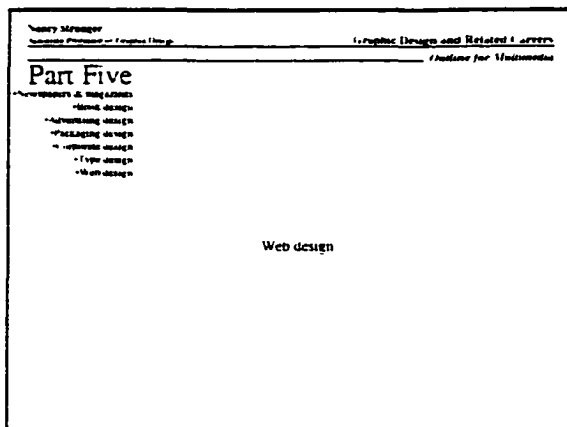
- Newspaper & magazine
- Book design
- Advertising design
- Packaging design
- Corporate design
- Type design
- Web design

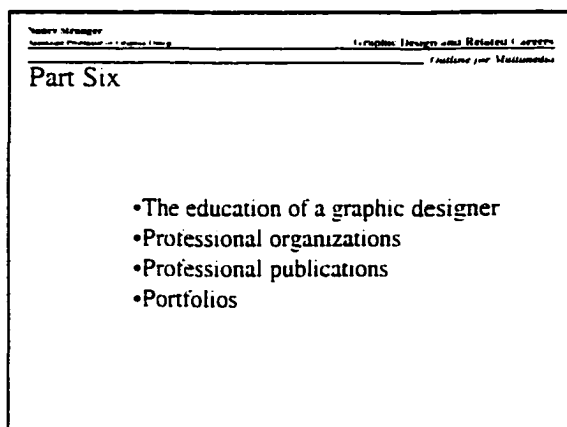
Packages must stand out and look good when grouped with others on a shelf

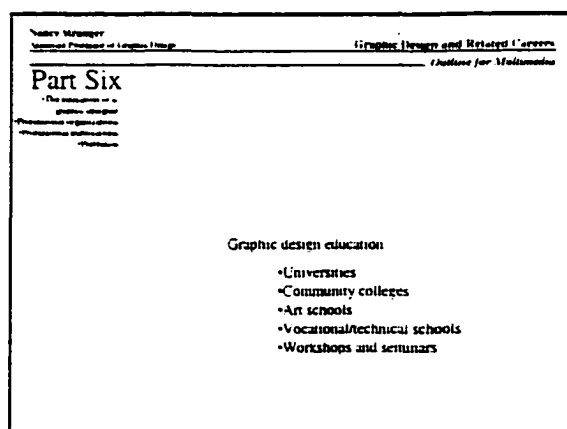


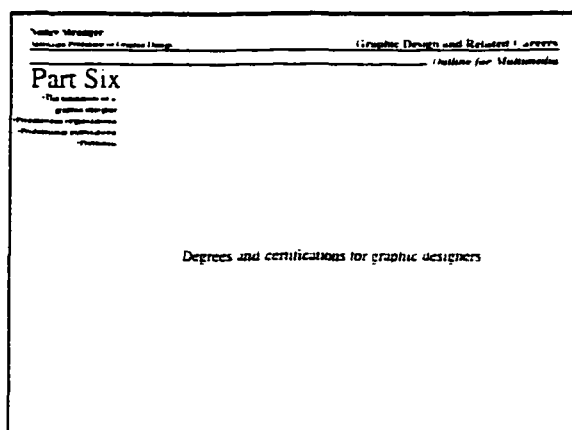


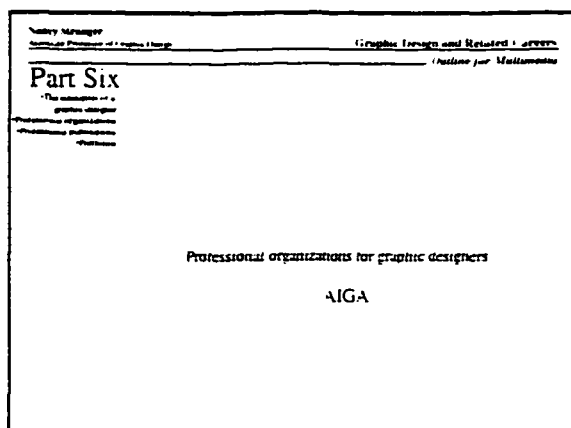


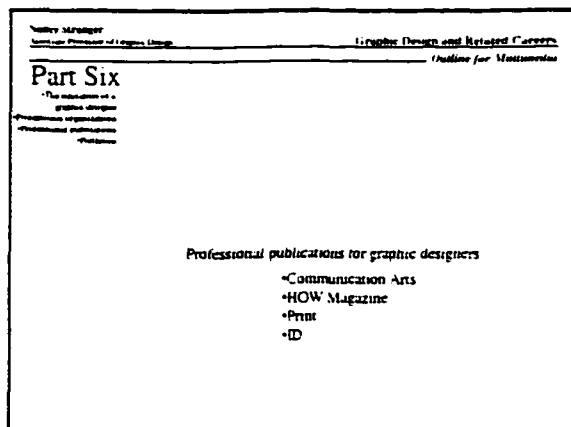


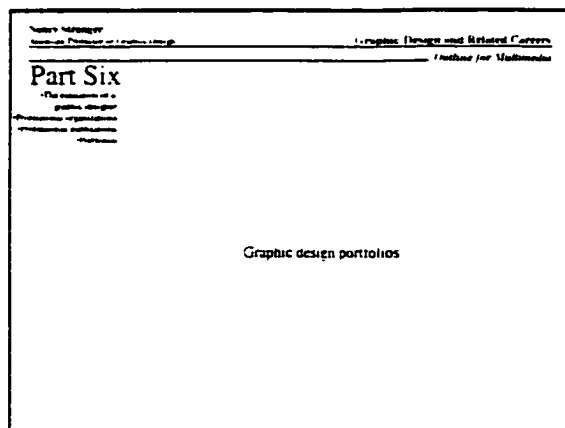










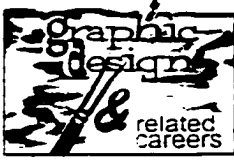


APPENDIX D

OBJECTIVE TEST PLUS CONCLUDING ATTITUDE SURVEY

APPENDIX D

OBJECTIVE TEST PLUS CONCLUDING ATTITUDE SURVEY



Participant: 00000

For the following statements, please circle the answer that most closely matches information you gathered from the multimedia.

1. The principle elements of any graphic design are
 - a. Photographs and illustrations
 - b. Images and page layout
 - c. Text and images
 - d. Photographs and clip art
2. The primary role of a graphic designer is to
 - a. Communicate by visual means
 - b. Advertise a product
 - c. Create something beautiful to add value to the culture
 - d. Design web pages
3. Graphic design education commonly encompasses
 - a. Courses in drawing and design
 - b. Courses in computer science and drawing
 - c. Courses in science and business
 - d. Courses in business and psychology
4. Professional organizations for graphic designers provide
 - a. A labor pool of freelance artists for corporations
 - b. Job training and job searching information
 - c. A source of discounted supplies
 - d. A forum for designers to network and learn new techniques
5. Illustrators usually work for
 - a. Advertising agencies
 - b. Themselves
 - c. Schools
 - d. Magazines

6. A concentration of graphic design jobs is usually found
 - a. In rural areas
 - b. In cities
 - c. On the west coast
 - d. In corporate America
7. From start to finish all design problems
 - a. Follow an identified process
 - b. Are all different, and the process varies
 - c. Are always completed in eight identified steps
 - d. Use processes and procedures identified by individual designers
8. Historically, the work of graphic designers has been tied to
 - a. The advertising business
 - b. The printing business
 - c. The Internet business
 - d. The newspaper business
9. The number of jobs for graphic designers has increased dramatically because of
 - a. Advances in technology
 - b. The availability of more newspapers and magazines
 - c. The number of university students studying art
 - d. The variety of education and training opportunities available
10. The types of jobs available for graphic designers require individuals who are
 - a. Creative and able to meet deadlines
 - b. Able to design computer databases and spreadsheets
 - c. "Laid back" and enjoy flexible scheduling
 - d. Able to draw well
11. Graphic design has to do with problem solving, and the first step in solving the problem is
 - a. Combining text and images on a computer
 - b. Coming up with a creative concept
 - c. Finding a photograph or illustration that is appropriate for the job
 - d. Determining the client's budget
12. Which graphic design field did the US Job and Labor Outlook Handbook project as one of the fastest growing careers in the country?
 - a. Desktop publishing
 - b. Color management
 - c. Computer illustration
 - d. Digital image manipulation

13. Which of the following careers is relatively new and growing extremely fast?
- a. Advertising
 - b. Exhibit design
 - c. Desktop publishing
 - d. Video game design
14. Which of these careers has a strong impact on consumers?
- a. Illustration
 - b. Advertising design
 - c. Newspaper design
 - d. Film design
15. Graphic design education is available at
- a. Two year schools
 - b. Four year schools
 - c. On the Internet
 - d. All of the above
16. A graphic design career that requires the designer to work in three dimensions is
- a. Package design
 - b. Video game design
 - c. Book design
 - d. Type design
17. Graphic designers
- a. Are licensed by the industry
 - b. Are certified at the state level
 - c. Are certified by state organizations
 - d. Do not have to have a license or certification
18. The two main categories of design for graphic designers are
- a. Print and film
 - b. Illustration and film
 - c. Web and advertising
 - d. Print and web
19. Preparing documents for a printer is a specialized area for a designer called
- a. Digital imaging
 - b. Digital prepress
 - c. Digital illustration
 - d. Digital design

20. Visual communication is
- A form of advertising to a broad audience
 - The exchange of thoughts, messages or information that is seen
 - Billboard design
 - Film production
21. The primary difference between an illustrator and a “fine artist” is that
- The illustrator makes art for museums and galleries
 - The illustrator makes art for enrichment of the culture
 - The illustrator makes art that satisfies the needs of a client
 - The illustrator makes art that can be sold or traded
22. Typography refers to
- The selection and arrangement of type elements in a design
 - The design and development of type styles
 - The families and organization of type
 - The measurement of type for printed documents
23. The birth of graphic design can be traced back to
- The invention of moveable type
 - The invention of the Macintosh computer
 - Markings on cave walls 30,000 years ago
 - Engravings and etchings used for reproduction of original art
24. Bitstream, Émigré, and Will Harris are
- Type foundries
 - Well-known Illustrators
 - Advertising agencies
 - Art museums
25. The most important thing a graphic designer has in a search for a job is
- His sketchpad
 - His cover letter
 - His portfolio
 - His resume
26. The largest mass communication producer is
- The magazine industry
 - The advertising industry
 - The packaging industry
 - The film industry

27. A good source for students looking for careers and information about careers in animation is
- Corporate world design
 - A sculpture studio
 - Disney
 - ArtsEdge
28. The most important impression of a book which frequently sways potential readers is
- The book layout design
 - The book cover design
 - The book content
 - The book color scheme
29. An inclusive, coordinated design system, consisting of standard typefaces, layouts, and colors, which seeks to reinforce the image of a particular business, is the work of
- An advertising designer
 - A type designer
 - A newspaper designer
 - A corporate designer
30. In recent years, traditional typesetters, separators, and prepress houses have been replaced by
- Computer networks
 - Service bureaus
 - Quick printers
 - Laser printers
31. A specialized field of graphic design that incorporates areas of design, architectural and product design, as well as multimedia expertise, is
- Exhibition design
 - Animation design
 - Type design
 - Illustration
32. Editorial, medical and natural history are all areas of specialization in the field of
- Type design
 - Advertising design
 - Corporate design
 - Illustration
33. Art, programming, animation, and psychology are all important factors in the development of
- Corporate design
 - Video game design
 - Animation design
 - Illustration

34. Information architecture. HTML code and graphics are all part of the field of
- Corporate design
 - Video game design
 - Web design
 - Illustration
35. Reading professional publications is important for graphic designers because
- It helps a designer keep abreast of what is going on in the industry
 - It keeps designers informed about conferences and competitions
 - It increases awareness of product and product sources
 - All of the above

Participant: 00000

Please conclude by giving your general impressions of the multimedia by answering the following five questions:

1=strongly disagree
2=mildly disagree
3=neutral
4=mildly agree
5=strongly agree

1. I learned a substantial amount of new information about graphic design and related careers from the multimedia.

1 2 3 4 5

2. I think that high school art students could gain enough information from the multimedia to interest them in further study of graphic design.

1 2 3 4 5

3. I think that if I were a high school art teacher I would find the multimedia an easy way to introduce art students to the field of graphic design.

1 2 3 4 5

4. I learned enough about graphic design that I am interested to study it further.

1 2 3 4 5

5. I would need more technology training to be able to use the multimedia effectively as a teacher.

1 2 3 4 5

APPENDIX E
LETTER TO UNIVERSITY CONTACT PROFESSORS

APPENDIX E

LETTER TO UNIVERSITY CONTACT PROFESSORS



Date:

Address:

Salutation:

This letter is to follow up on our recent telephone conversation regarding the inclusion of art education students from the University of Northern Colorado in a research project that I am conducting.

I am currently completing the requirements for the PhD degree at Colorado State University. My research involves the integration of technology in teaching art, especially the effectiveness of a web-based multimedia teaching tool about graphic design and related careers. I have developed this multimedia over a period of approximately two years, and I feel that it can be used by art teachers to provide their students with a comprehensive overview of the graphic design industry without actually purchasing expensive hardware and software and learning how to use it. I have chosen to work with pre-service art teachers on this project, because they are the future educators who will be thinking about developing and using ways to integrate technology, as well as making decisions about content areas to include in the art curriculum.

When I meet with your students, they will first be asked to fill out a brief survey about their perceptions of fine art and graphic design. They will also provide information on the survey form about the number of prior computer courses they have taken, as well as give a self-reported level of technology expertise. Following the survey the students will be given an objective test about graphic design. Completion of the survey and the objective test should take approximately 20 minutes. The students will then be guided through the web-based multimedia. Information will be provided about the main content on the site, and how to navigate the site effectively. After I have spent a total of approximately one hour with the students, they will be given the web address for the multimedia, and invited to pursue it further during the following two weeks. Data will be collected at the end of that time to assess the gains in knowledge about graphic design and graphic design careers, as well as any change in attitudes.

I will need a letter from you on school letterhead stating that you (and students in your course) have agreed to cooperate in this project. The letter should say that you are familiar with the project, that you are comfortable that the participants are adequately protected, and briefly outline your involvement. I have enclosed a self-addressed/stamped envelope for your convenience in responding to this request. Thank you for your cooperation, and I look forward to working with you.

Sincerely yours,

Nancy K. Stranger
Doctoral Candidate
School of Education
Colorado State University

970-945-2883-h
970-947-8203-w
stranger@coloradomtn.edu

APPENDIX F

LETTER OF REPLY FROM COLORADO STATE UNIVERSITY

Department of Art
Fort Collins, CO 80523
(303) 491-6774
FAX: (303) 491-0505

September 19, 2001

Nancy K. Stranger
995 Cottonwood Lane
Glenwood Springs, CO 81601

Dear Nancy:

This letter is to follow-up your request regarding the inclusion of art education students from Colorado State University in a research project you are conducting. I have spoken with my students and they have agreed to fill out a brief survey about their perceptions of fine art and graphic design, take an objective test about graphic design, and attend a presentation on web-based multimedia. They are also aware that after a period of time you will return to survey their involvement (or not) with this information.

We acknowledge the roles we will play in this study, feel adequately protected, and are comfortable participating in this project.

Sincerely,



Patrick Fahey, Associate Professor
Department of Art
Colorado State University
Fort Collins, Colorado 80523-1770
(970) 491-7230

APPENDIX G

LETTER OF REPLY FROM UNIVERSITY OF NORTHERN COLORADO

7 November 2001

Celia Walker
Regulatory Compliance Office
Colorado State University
Fort Collins, Colorado 80523-2046

COPY

RE: Nancy Stranger, doctoral research on the integration of technology in teaching art

This letter is to verify that Ms Stranger (with principle investigator Dr Jansen) has received my approval and the approval of the art teacher education students in my class to administer her doctoral research survey and subsequent presentation (treatment) on the integration of technology in teaching art. I am familiar with the nature and intent of Ms Stranger's research concerning student perceptions of fine art and graphic design including a self-assessment of their technology expertise.

Pending your office's approval of Ms Stranger's human subject research with the 14 undergraduate and graduate art education students in my methods class, we look forward to working with her and Professor Jansen on this project.

Sincerely yours,

Richard S Munson, PhD
Professor of Art and Art Education
Head, Art Education Area
970.351.2477
rmunson@unco.edu

APPENDIX H
FOLLOW-UP INFORMATION FOR STUDY PARTICIPANTS

APPENDIX H

FOLLOW-UP INFORMATION FOR STUDY PARTICIPANTS



THE EFFECTS OF MULTIMEDIA ON TRAINING PRE-SERVICE ART TEACHERS IN THE GRAPHIC DESIGN CONTENT AREA

Thank you for agreeing to participate in this research project.

The web address for the project is: <http://www.faculty.coloradomtn.edu/stranger>.

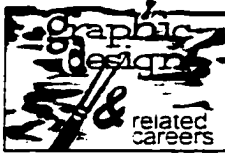
Thank you for participating in this study.

Nancy Stranger
Doctoral Candidate

APPENDIX I
FINAL LETTER TO UNIVERSITY CONTACT PROFESSORS

APPENDIX I

FINAL LETTER TO UNIVERSITY CONTACT PROFESSORS



Date:

Address:

Salutation:

I really enjoyed meeting you and your class Tuesday evening. I appreciate you giving me the opportunity to "borrow" your students for my research project. Your willingness to participate is a great help in the final stages of my PhD program.

Please remind your students that the web site for the project will continue to be available. My adviser and I have decided to leave the site up through January 4th; it is our hope that your students will access the site again, and provide further feedback. In case anyone has forgotten the site address, it is:

<http://faculty.coloradomtn.edu/stranger>

There is an e-mail link (to me) on the home page of the site for any follow-up comments. Again, thank you for your cooperation and participation in my research project.

Sincerely yours,

Nancy K. Stranger
Doctoral Candidate
970-945-2883-h
970-947-8203-w
stranger@coloradomtn.edu