AN ABSTRACT OF THE THESIS OF

Suppakorn Disatapundhu for the degree of Doctor of Philosophy in Education presented on June 1, 1993.

Title: An Assessment of Computer Utilization by Graphic Design Professionals in Thailand

Abstract approved
Thomas P. Evans

The uses of computer technology in the fields of art and graphic design in Thailand were investigated for the purpose of identifying levels of current computer use from 280 responses to a specifically designed questionnaire among: 1) full-time graphic design educators, 2) art and design students, and 3) graphic design directors in professional business positions.

The study instrument consisted of a questionnaire developed by the researcher, reviewed by a panel of seven experts selected by the Department of Creative Arts, Chulalongkorn University. The panel verified content-related evidence to ensure the validity of the instrument. Appropriate statistical procedures were implemented to develop responses to questions of interest. Analysis of the data showed that a majority of educators, students, and design professionals supported the use of computer in their pro-

fessions and/or coursework, and that majorities of the same groups made regular use of computers.

Subject to differences in rank ordering of computer usage among population groups, majorities from each group agreed that publications and graphics constituted the area of greatest use. A majority of the population agreed that computers helped to improve efficiency within the studio environment, and there were only slight differences among the three groups in generalized support of the use of computers within art and design curricula. All groups agreed that educational emphasis should be placed at the level of the baccalaureate degree, subject to the possible integration of computer training at all educational levels.

Students reflected the highest percentage of use frequency, followed in order by professionals and educators. Each group reflected its own specific concerns in perceptions of major barriers to the use of computers in graphic design fields: Educators noted the lack of budgetary resources to install and maintain computers; students noted the lack of computer availability for hands-on experience; and design professionals perceived a lack of opportunity to attend training courses.

Overall, the results of this study indicated that significant differences existed between groups representing academic fields (i.e., educators and students) and graphic design professionals for all criteria measured.

An Assessment of Computer Utilization by Graphic Design Professionals in Thailand

by

Suppakorn Disatapundhu

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Completed June 1, 1993

Commencement June 1994

APPROVED:

Redacted for Privacy

Professor of Education in charge of major

Redacted for Privacy

Department of Education

Redacted for Privacy

Dean of Graduate School

Date thesis is presented June 1, 1993

Typed by B. McMechan for Suppakorn Disatapundhu

ACKNOWLEDGEMENTS

This study would not have been possible without the support and assistance of my teachers, family and friends. First, I would like to thank Drs. Thomas Evans and Kenneth Ahrendt, my thesis advisors, for their support, careful guidance, and direction.

Special thanks are also expressed to Dr. Robert Rice, my first faculty advisor, for his assistance and support, and to my committee members, Drs. Kenneth Winograd, Meg Savige, Jake Nice, and ZoeAnn Holmes. A special note of thanks is offered to Professor David Foster who was a constant source of compassion and encouragement.

Grateful acknowledgements are extended to all my colleagues who helped me complete my study, as well as to all my friends who made this period of my life so enjoyable as well as successful.

I am especially grateful to my parents, for everything I have accomplished I give them credit. For their constant encouragement, I would like to thank my sisters and their family members. Finally, my deepest gratitude is offered to my wife, Monthakarn, and to my son, Kluee, for their support, love, patience, and sacrifice of family life throughout this long period of study. Their compassion and love will always be remembered.

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CHAPTER 1

INTRODUCTION

Computers are one of the most important recent developments, representing a technology that will continue to exercise an effect upon nearly aspect of life. In scientific fields computers play important roles as research tools, and, in business, computers serve as management tools for gathering information or facilitating communications. It is generally accepted that the use of computers will spread to nearly every area of human endeavor. Thus, in only a brief period of time nearly everyone in modern society will be affected by computer technology (Calhoun, 1980).

Purpose of the Study

The purpose of this study was (1) to investigate the use of computer technology in the fields of graphic design in Thailand, and (2) to identify present and future patterns of computer usage among graphic design educators, students, and professionals in Thailand. Descriptive data

were used to identify methods for the enhancement of the integration of computer technology into art and design programs at Chulalongkorn University, as well as to provide a foundation upon which future research on the use of computers for graphic design can be based. These data will be used to identify the following:

1) The level of computer utilization among graphic design educators, students, and professionals in Thailand.
2) The advantages in the professional work area which are derived from the utilization of computer technology among graphic design educators, students, and professionals in Thailand.
3) Recommendations for the formulation of graphic design curriculum content to be applied to the use of computers in art and design courses offered by the Department of Fine and Applied Arts, Chulalongkorn University, Bangkok, Thailand.
4) Recommendations for the formulation of graphic design content to be applied to the development of short-term training and retraining programs for graphic design instructors in institutions of higher education, as well as professionals currently employed in the field of graphic design in Thailand.

Rationale and Theoretical Framework for the Study

The theoretical framework for the study was drawn from four areas: 1) the effect of computers upon modern society, 2) social efficiency and computer literacy curricula, 3) the role of computer technology in art and design, and 4) the background of professional graphics design and graphics design instruction in Thailand. These areas are discussed in the following sections.

Effect of Computers Upon Modern Society

Due to the adaptability, accessibility, versatility, affordability, and ease of operation of computers, as well as the compact nature of the microcomputer, this new technology has become a popular choice of tools in every professional field (Drum, 1980). To assure that younger generations thrive, as well as survive, in modern, technologically developed societies, they must learn to use and manage new skills and techniques that will enable them to make effective use of computers (Hunter, 1983). More than 20 years ago, Ratcliff (1971) predicted the growing importance of computers, stating that the number of individuals who will work with or be affected by computers in the future will be so large that the entire populace will need to know something about this technology. More recently, D'Souza (1985) stated that without some form of computer competency, many individuals will be denied access to present

and future job markets. Computer knowledge has since become a required basic skill in many professions. Fortunately, many educators have realized and accepted the role that the computer will play in their everyday lives. At present, some form of computer knowledge is necessary for an individual to function successfully. Therefore, the development of curricula based upon computer competency is a necessary step toward the preparation of individuals to meet the needs of social efficiency in the future.

Social Efficiency and Computer Literacy Curricula

The fundamental structures and activities within modern societies are changing rapidly, a phenomenon which is at least partly rooted in computer technology. Individuals must gain the understanding, skills, knowledge, and tools necessary to cope with these changes. As a result, those who know how to access and use technology will have the power to control governments, industry, and economic and social decision-making (Hunter, 1981).

Since early in the 20th century, the term "social efficiency" has been used in education to provide a theoretical basis for the description of social changes which have taken place during the American industrial revolution (Camp, 1972). The basic principle of social efficiency is to prepare individuals to serve as well as to fit within appropriate roles in society. Learning institutions are

the principal sources of assistance and preparation (Bobbitt, 1912; Charters, 1926a; Ross, 1901). As defined by Kliebard (1986), social efficiency education consists of those programs or curricula designed "to teach people specifically and directly those exact skills required for the tasks that lay before them in life" (p.108). Programs which were summarized as follows:

> The scope of the curriculum needed to be broadened beyond the development of intelligence to nothing less than the full scope of life activities, and the content of the curriculum had to be changed so that a taut connection be maintained between what was taught in school and the adult activities that one would later be called upon to perform. Efficiency became more than a byword in the educational world; it became an urgent mission. That mission took the form of enjoining curriculum-makers to devise programs of study that prepared individuals specifically and directly for the role they would play as adult members of the social order. (pp. 89-90)

Charters (1926a) indicated that the principal purpose of social efficiency curricula was to replace what was useless with what was directly useful: "We should define curriculum on the basis of what people are going to do" (p. 327). Thus, in accordance with this principle, the purpose of integrating computer literacy or computer knowledge into art and design programs would not be identical to educational programs in the sciences or engineering. However, though it has had an immense and far-reaching influence on almost every aspect of modern life, the term computer literacy has proved difficult to define. In general, it is accepted that computer literacy means to understand

the uses of computers and to be able to use them effectively (Friedrich, 1983).

In the United States, it is difficult to deny that every step of life has been and will continue to be affected by computer technology (Eisele, 1979; Lineham, 1983). Thus, individuals must be prepared to meet this challenge. Glenn and Klassen (1983) have stated: "Computer technology and information processing are not fads that will pass the time. They will continue to play an important role in life of each citizen" (p. 215). In general, higher educational institutions have lagged considerably behind other organizational forms in the use of computers. However, at present, institutions of higher learning are finding that computers can add efficiency to the teaching and the learning process. As observed by Molnar (1981),

> Rapid change is not easily accepted by a profession such as education, which usually assures innovation adoption by generations of teachers and decades of time. . . . In the past, this change has been slow and continuous; however, the future may demand rapid revolutional change. (p. 28)

In a recent poll, 1,346 participants were asked how life in the United States in the year 2000 would differ from life today. The answers indicated that there would be a greater use of computer technology, which would be a significant factor in life in the 21st century (Gallup, 1984).

Art is one of the areas in which it may be presumed that the computer will exercise a major influence.

Role of Computer Utilization in Art and Design

The utilization of computer technology in art and design has advanced at a very rapid rate, and is used by increasing numbers of graphic artists and designers on a daily basis. This approach to art is exercised by means of the creative process of constructing visual images, wherein artists use computers to develop and expand their creative ideas and their growth potentials. The computer has thus been used since early 1964 as a medium for the creation of aesthetic imagery (Davis, 1973; Peterson, 1984).

This transition did not occur overnight and, among higher educational institutions, there has been some resistance across the nation to the implementation of the concept of the computer as a medium for creative art. Many authorities in the field feel that the computer is merely a scientific instrument and cannot be used as an artistic tool. These attitudes assured that artists and designers did not initially have access to appropriate hardware or software for the development and design of products for aesthetic purposes (D. Foster, Eugene, OR, personal communication, January 1992). As observed in the *Computer Graphics Career Handbook* (Computer Graphics, 1989):

> To make early computer graphics system work, people needed to learn computer languages, operating systems,

> hardware and communications as well as computer graphics. Since there were often no resources to support the highly specialized needs of computer graphics, computer graphics experimenters had to do the work themselves. (p. 15)

At present, computers are utilized by a substantial number of artists and designers. Gallup (1984) has stated that the artist and designer of the future will increasingly use computers as a design tool since they enhance creativity and the ability to explore new areas. Thus, some artists and designers use computers to create two-dimensional images and animation, while others are exploring the use of computers in such areas as weaving, sculpture, and the performance arts (Leavitt, 1976). Bickford (1983) stated that the use of computer devices will allow artists and designers to achieve extremely difficult or impossible tasks. Certainly, the computer can be used to increase design speed and to expand the range of the designer's work (Hiesinger, 1983). As a visual arts medium, computers can be used in a variety of ways to simulate activities and arts management activities currently produced in studios (Ettinger, 1980; Ettinger & Roland, 1980).

It has been only recently that artists have begun to explore the potential of computers as an art medium, using computer software to process compositional problems or to program the computer to produce visual solutions. Computer graphics provide a significant potential for design progress insofar as the processors enable artists to generate large numbers of different solutions to given visual prob-

lems in short periods of time (Bickford, 1983; Hiesinger, 1983; Lineham, 1983; Madeja, 1983). However, the literature concerned with the role of computers in the development of curricula for the arts, does not identify the problems, and neither does it clearly demonstrate how the skills and content areas necessary for effective computer usage should be developed (Ettinger & Rayala, 1980; Greh, 1986; Jones, 1978, 1980; Madeja, 1983; Weaver, 1989; Welter, 1989; Zacher, 1984). Moreover, though numerous artists have applied the computer to traditional forms of art and graphic design, few have built upon the unique communicative characteristics of this technology, and currently no means have been developed to update skills within regular processes of staff development.

Background of Graphic Design in Thailand

Many professionals in the arts as well as educators in Thailand initiated their careers prior to the introduction of microcomputer systems, and many of this number continue to remain ignorant of the potential uses of computer technology. In this professional area, even less is known about software and model development or the simulation capacities of computers. Thus, computer graphics or art is a relatively new area of exploration among Thai artists and designers and within educational institutions. Progress in this area has been slow since the computer has been consi-

dered to be a scientific tool rather than an art medium. In addition, many Thai artists and designers have felt reluctant to use this technology because the computer has been reported to be a tool of scientific efficiency, creating anxieties that the computer may be used to deprive them of their livings and negatively impact their crafts and their careers (Disatapundhu, 1989a). Thus, the majority of designers and design educators do not know how to use computers and have not been prepared for the impact of computer technology upon their careers and society.

However, computers are becoming more readily available in design businesses and art schools in Thailand. At present they may be acquired for less than the cost of an electric typewriter. The result is that the acquisition of microcomputers is presently within the reach of most educational and professional institutions (Chitranukul, 1988). The investigative basis for the present study was that designers and art educators should be made aware of this technology to be able to foresee its impact upon their professions. Graphic designers and design educators in Thailand must be provided with effective and efficient continuing education in order to enhance and maintain their skills. Training for future careers in graphic design within these disciplines will require knowledge of the capabilities of this new technology.

Research Questions

The proposed study of the use of computers in the fields art and design in Thailand will investigate the following research questions:

1) To what degree do graphic design educators, students, and professionals in Thailand support the use of computers in their profession?
2) What is the frequency of computer use among graphic design educators, students, and professionals in Thailand, and are the differences in the frequency of use among the three population groups significant?
3) In what ways are computers currently used among graphic design educators, students, and professionals in Thailand?
4) Do graphic design educators, students, and professionals in Thailand support the use of computers within art and design curricula?
5) Do graphic design educators, students, and professionals in Thailand support the integration of a standard of ethics for the use of computer technology as part of the art and design curricular content?
6) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what advantages are likely to result

from the increased utilization of computer technology?

7) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what obstacles are perceived as the principal barriers inhibiting the utilization of computers in graphic design fields?

8) Among graphic design educators, students, and professionals, what types of computer knowledge and skills are perceived as essential for the present and future development of graphic design fields?

Limitations of the Study

The data for the present study were collected during the 1991-1992 academic year from three target populations:

1) Graphic design educators in Thailand who were full-time, active instructors of graphic design courses in the Department of Fine Arts and Design, subject to the authority of the Ministry of Universities and Institute of Technology Affairs or the Ministry of Education Affairs. These agencies included Bhurapa University, Chulalongkorn University, Chiangmai University, Rama IV Institute of Technology, Chao Khoon Ta-Harn campus, Rangsit University, Silpakorn University, and Srinakarinwirot University. A second group of full-time,

active graphic design instructors were from teacher colleges and the Rajamangala Institute of Technology, subject to the authority of the Ministry of Education, as indicated by the Department of Educational Statistics (Ministry of Education, 1992), or to the Ministry of Universities and Institute of Technology Affairs and the Ministry of Education.

2) Students enrolled in computer graphics classes at Chulalongkorn University.

3) Graphic design directors in professional business positions, as listed in the Thailand Advertising Directory (Maritanakorn, 1992).

Note that the present study does not address areas other than those which may be connected with the uses of computer technology in art and design university education or in associated professional fields.

Definitions

Computer: Machines or devices with input and output components, the principal function of which consists of a control unit responsible for the direction of information processing (Ellis, 1974).

Computer art: Art created through the use of the computer, resulting in images created either by means of mathematical formulas or by traditional

means (e.g., photography) as enhanced by computer. In the sense intended, the computer is merely a tool, with artistic creativity derived from the activities of either programmers or users (Computer Graphics, 1989).

Computer competency: In general, computer literacy means the ability to understand and to use computers (Friedrich, 1983). For the purposes of the proposed study, reference is specifically directed toward educators, students, and design professionals who use computers as an art medium to create imagery for aesthetic purposes as well as for a management tool.

Graphic design educators: For the purposes of the present study, instructors in graphic design in all higher education institutions in Thailand (i.e., those colleges and universities placed under the authority of the Ministry of University Affairs, as well as teacher training colleges and Rajamangala Institute of Technology placed under the authority of the Ministry of Education.

Graphic design professionals: Practitioners of the arts of visual communication; the essence of graphic design is the visual communication of messages with the primary function of promoting products or services (Craig, 1983). For the purposes of the proposed study, graphic design pro-

fessionals are those individuals currently employed by design studios and advertising agencies in Bangkok, Thailand.

Graphic design students: Trainees in the art of visual communications; the essence of graphic design study is to train individuals in the visual communication of messages (Craig, 1983). For the purposes of the present study, graphic design student subjects will consist of third- and fourth-year students enrolled in computer graphics classes at the Faculty of Fine and Applied Arts, Chulalongkorn University.

CHAPTER 2

REVIEW OF RELATED LITERATURE

The present study is based upon the rapid expansion of the uses of computers and computer technologies in the fields of art and design education and associated professional fields. However, research completed upon topics related to computer art curricula is limited in scope. At the level of the baccalaureate degree, only a single major study has been conducted.

Weaver (1989) identified curricular concerns related to computer activities in art programs at the college level. College educators who taught courses in computer art and professionals who worked in the computer graphics industry were surveyed. It was found that these professionals supported the use of computers as a tool for artistic applications as well as the integration of the computer into art and design curricula over a broad range of areas. There were no significant differences between college instructors and computer graphics professionals for the ranking of the skills and competencies required among college students in this field. Weaver concluded that both computer and non-computer skills and competencies should be encompassed within college art and design curricula to

facilitate student involvement and computer competence for artistic applications. The skills and competency areas that received the highest ratings included: 1) hands-on experience with computer graphics systems, 2) development of skills for the creation and production of computer-generated imagery, 3) knowledge of color, and 4) visual problem solving skills.

The present study was directed at the identification of levels of computer experience, as well as current and intended future computer utilization, among graphics design educators, students, and professionals in Thailand for the purpose of providing guidelines for the future development and integration of computer technologies into graphics design education programs. A summary of related literature is presented in this chapter in the following sections:

1) curriculum development models,
3) computers in education,
4) computer literacy in art education,
5) impact of computers in art and design education,
6) impact of computers upon art and design professionals,
7) computer technology and the future of art and design,
8) development of art and design education in Thailand, and
9) computers in art and design education in Thailand.

Curriculum Development Models

The curricula of educational institutions constitutes the foundation of the education process. It consists of the tools through which theoretical and philosophical concepts are translated into an effective plan that will affect the instructional process (Tyler, 1977). However, there is no general consensus concerning an ideal for the curriculum development process. Gay (1980) summarized four conceptual models for curriculum development: 1) the academic model, 2) the experimental model (i.e., the intuitive model), 3) the technical model, and 4) the pragmatic model.

The academic model considers curriculum development to be a systematic process governed by rationality and logic, based upon learner characteristics, societal factors, and subject matter disciplines. In the experimental (intuitive) model, the processes are learner-centered and activity-oriented and are generally found in personalized, self-paced instructional programs. The technical model is an analytical approach, or one which seeks to maximize program proficiency and performance in such areas as business and/or industrial management. The pragmatic model employs a combination of concepts and principles from different theoretical models to help develop a curriculum.

However, Gay (1980) indicated that whereas each of these models had gained a degree of general acceptance, each has been seldom implemented in an idealized form.

Rather, elements from one or another were combined in a curriculum planning process. Thus, for curriculum development a systematic approach is desirable, and decision-making in connection with this process is an important part of curriculum design (Houle, 1972). Samahito (1984) indicated that curriculum development decision-making reflects a statement of goals which link values, assumptions, and goals in a coherent framework that can serve as a standard and guide for present and future action. Tyler (1949) indicated that the identification of all possible educational activities was the initial step in the curriculum development process.

Educational activities may be identified from a variety of sources, including students and educators, as well as from broader views derived from the community or the general environment. The development of new curricula for educational institutions must be grounded in the philosophy and psychology of the concerned institution, which is responsible for establishing goals and objectives (Leyton-Soto & Tyler, 1969). Tyler contended that the objectives of a curriculum should be filtered through a philosophical and psychological screen (Kliebard, 1977). The psychological screen is thus a principle of learning that the concerned developers believe to be sound:

> A psychology of learning not only includes specific and definite findings but it also involves a unified formulation of the theory of learning which helps to outline the learning process, how it takes place under

> what conditions, what sort of mechanisms operate and the like. (Tyler, 1949, p. 41)

The effective application of this screen presupposes adequate training both in educational psychology and in human growth:

> A knowledge of the psychology of learning enables us to distinguish changes in human beings that can be expected to result from a learning process from those that cannot. A knowledge of the psychology of learning enables us to distinguish goals that are feasible from those that are likely to take a very long time or are almost impossible of attainment at the age level contemplated. Psychology of learning gives us some idea of the length of time required to attain an objective and the age levels at which the effort is most efficiently employed. (Tyler, 1949, pp. 38-39)

However, there are various factions that reflect differing philosophical views of which sources serve to validate educational goals and curriculum objectives. One philosophy states that curriculum should relate to an understanding of an organized field of study (Johnson 1977; Kliebard 1977; Taba, 1962; Tyler, 1977). A second view is that the selection of a curriculum and the validation of objectives should be learner-oriented (Johnson 1977; Taba, 1962; Tyler, 1977). A third philosophy states that curriculum should be formed on the basis of societal and cultural demands and circumstances as well as persistent problems of living (Charters, 1926b; Johnson 1977; Kliebard 1977; Taba, 1962; Tyler, 1977; Smith, Stanley, & Shores, 1957).

According to Samahito (1984), Smith et al. (1957) developed two basic methods for the evaluation of educa-

tional objectives as based upon both societal and individual needs. The two broad types of evaluations were (1) logical selection of subject matter and (2) a judgment selection and experimental procedure. Judgment selection is the process through which questions are asked and then answered by the decision-maker; the experimental procedure is an accepted method of trying out subject matter under prescribed conditions. This method, though seldom used, avoids outside prejudices, judgments, and conditions which might influence the results.

The second type of evaluation is empirical analysis, or the procedure used for determining the validity of objectives. This type of evaluation includes information collection from a variety of sources, with subsequent analysis of the collected data from a variety of viewpoints (Stake, 1977). In general form, the analytical procedure consists of the analysis of individual tasks for the purpose of discovering the subject areas needed to function within these activities (Davies, 1973; Samahito, 1984; Smith et al., 1957). Smith et al. classified the analytical procedure in three categories: 1) activity analysis, or procedures for discovering the general activities of people; 2) job analysis, a method used for determining what should be taught to establish a vocational preparation; and 3) knowledge analysis, used to determine the levels and general uses of knowledge and skills. The various techniques used for this analytical procedure include inter-

views, the conduct of surveys, and the administration of questionnaires.

Given the complexity of data sources, decision levels, and the reasons for generalities as well as specifics among the statements which define the means and ends of differentiated education processes, Goodlad (1966) perceived that learning concepts must be derived from educational aims set by institutions and subject to the approval of higher authority. In this setting, rational decision-making cannot occur until appropriate evaluations and needs assessments are established.

Currently, education planners have been unable to agree on a clear statement of how the skills and content areas necessary for the effective usage of computer technology in art can be identified and developed. Thus, a systematic approach to the development of an effective instructional program using computers in art and design curricula is necessary. This could be accomplished by the implementation of a needs assessment procedure to provide a foundation for the development of goals and objectives for art and design curricula at the bachelor's degree level.

Kaufman (1973, 1975) indicated that a needs assessment is a process of defining the desired end of a given sequence of program planning. English and Kaufman (1975) viewed assessment as a process to make specific what schooling should be about and how it can be assessed. It is a way to determine if innovation is necessary or desir-

able in a planning procedure, or as a process for defining outcomes in education; therefore, the assessment process consists of a set of criteria in accordance with which planned curricula can be developed and compared. To develop a valid and useful needs assessment, the educational partners or learners, including professional representatives and community members as well as educators, and community members, should be involved in the process of defining needs. This process should also include an external referent for needs determination, such as economic survival in the operational world the learner confronts after exit from the educational community.

A needs assessment is a tool placed at the disposal of educational curriculum developers, which enables them to examine problems within schools. It is a process which allows planners to discriminate between means and ends, as well as between the purposes of the schools and the curricular constructs. Therefore, the needs assessment is basically a procedure that can be utilized to gather information from participants and to develop viable solutions for decision-making in educational programs.

A needs assessment is an appropriate first-step technique for use in the investigation of the impact of computer technology in art and design curriculum at the bachelor's degree level (Weaver, 1989). However, the literature concerned with the application of needs assessment procedures in art and design education is limited in extent, and

has been largely confined to addressing the need to logically and systematically plan for future curricular development. For example, both Weaver (1989) and Zacher (1984) used the Kaufman (1973, 1975) needs assessment procedures to obtain relevant information on goals and the logical arrangement of curriculum objectives for art and design programs. Similarly, for the present study, a needs assessment was considered to be an appropriate procedure for the investigation of the use of computer technology among design professionals in Thailand. It was presumed that such a fact-gathering procedure would provide the current and available information necessary to implement a decision-making process for the integration of computer technology in the art and design curricula at the bachelor's degree level in Thailand.

Computers in Education

The uses of computers and computer applications have been proposed for a variety of services within modern educational systems. A tremendous volume of research in computer applications and computer-related technologies for education has been undertaken throughout the world (Becker & Associates, 1988). Cropley and Dave (1978) have even concluded that the impact of rapid changes throughout contemporary society initiated by advances in computer tech-

nologies has created the need for a new concept or review of education.

In 1960, there were no more than 150 campuses across the United States which used computers (Caffrey & Mossman, 1967). By 1974, more than 3,000 institutions in over 100 countries were listed in an international directory of computing (*International Directory of Computer and Information System Service*, 1974). By the academic year 1969-1970, more than one million students were enrolled in courses related to computers (Hemblen, 1972).

As early as 1972, Levien (1972) had foreshadowed five broad roles for computer utilization that would facilitate educational instruction:

> One use of computers is in preparing instructional materials. Computer can help edit, revise, and duplicate instructional texts, and prepare diagrams and tabular information.
>
> A second use is in managing instruction. Computers can keep students record, give students access to guidance and instruction, and channel communications among students and between students and teachers.
>
> Thirdly, computers can be used in instruction itself. They can present instructional materials and sequences in response to student performance, administer drill, modify instructional materials, conduct demonstrations, exercises, and games; provides bibliographic services and access to data, and give students computational power for problem solving.
>
> The fourth use for computers is in evaluation. They can help evaluate students by giving tests, computing grades, and diagnosing needs. They help students evaluate their own progress and make educational choices. They can be used to evaluate courses by collecting and helping analyze student opinions about the course and data about the student's performance in them.
>
> Finally, they help to do basic research on teaching and learning by administering instructional ex-

> periments, whose results can also be analyzed by computer. (p. 60)

Predictions and/or descriptions of computer utilization in schools have varied among educators (Stewart, 1983; Taylor, 1980). Watts (1981) stated that there were no less than 12 fundamental and potential areas of application for computers in education, including administrative procedures, curriculum planning, professional development, library management, research, guidance and special services, testing, instructional aids, instructional management, computer-assisted learning, computer awareness and literacy, and computer hardware and software development. Presently, most colleges and universities across the U.S. use computers for administration, instruction, and research, leading Breslin (1984) to state that those that "cannot rise to the technological challenge may not survive in the long run" (p. 50).

However, it has become increasingly obvious that technology is not an independent variable, and that the ways in which given tools are used is dependent upon the cognitive, effective, and social skills of learners, as well as the social environment (Michaels, 1986). Some research investigations have been equally as interested in processes as they are the outcomes. For example, studies on the role of word processors in writing have focused upon interactions with the writing process (Bruce, Michaels & Watson-Gregeo, 1985; Daiute, 1985; Ruehr, 1987). Others have expressed a

greater interest in cognitive processes than in behavioral outcomes (Anderson, Boyle, & Reiser, 1985; Barclay, 1986; Darvin, 1983; Fisher, 1986; Hunter, 1987, 1988; Roseman & Brearton, 1989).

Considerations of ethics and values have also surfaced as issues in the educational uses of computers. These issues involve intellectual property rights, the right to privacy, honesty in communications, and equitable access to information. As computers enter the learning environment, it is imperative that students are instructed in the ethical, legal, moral, and social aspects of the uses of computers (Hunter, 1988). Even in this sense, the role of the teacher has increasingly become the focus of attention, and efforts have been undertaken to understand the new role that teachers have created for themselves as they have introduced new tools and processes into the classroom, as well as how computers can be used to enhance the learning process (Anderson et al., 1985; Collins & Steven, 1982; Copeland, 1985; Eylon & Reif, 1984; Hawkins & Sheingold, 1986; Krendle & Fredin, 1986).

The integration of computers and computer applications into the classroom has not occurred without negative comment. Sloan (1985) observed that computers and computer technologies:

1) perpetuate unwarranted emphasis upon technical and utilitarian reasoning, neglecting other values and

forms of thinking that should be part of a liberal education;

2) maintain a preoccupation with mechanistic imagery, neglecting that which is most fundamentally human;
3) are dehumanizing, for reasons of arguments 1 and 2, and because they foster emotional and empathic insensitivity;
4) do not necessarily improve learning or teaching, and may in fact inhibit both through a diversion of attention and resources;
5) do not necessarily prepare one for entry into workplace, and may not provide a significant personal advantage in other arenas; and
6) threaten human values and perspectives within educational systems.

These warnings notwithstanding, most colleges and universities in the United States have used, and will continue to use, computers within their institutions for purposes of administration, instruction, and research. Anderson and Hunter (1986) have suggested that continuous research should be undertaken to monitor and assess the consequences of computer innovations upon students, teachers, and society.

Computer Literacy in Art Education

In the early 1970s, concepts of computer literacy were based upon understanding of computers and computer technology sufficient to enable the conduct of intelligent conversations. However, since the role of computers has become increasingly important to our everyday lives, the meaning of computer literacy has changed . D'Souza (1985) distinguished three levels of computer understanding: awareness, literacy , and fluency. Chitranukul (1988) has synthesized these levels as follows:

> Computer awareness is the lowest level of understanding, implying reasonable comprehension about what a computer is, and what it can or cannot do. Computer literacy implies a reasonable comprehension level about computers and how to use them. It includes a working vocabulary about computers and information system processing, and a perspective for how non-technical people can manage in the world of technology. Computer fluency, the highest level of computer understanding, describes a person with the ability to write and analyze computer programs, with an understanding of system programs, system analysis and design, and knowledge of data management systems. (p. 26)

However, in the art and design fields, computer literacy and the skills necessary for the effective use of computer technologies have not been clearly identified. Therefore, artists, designers, and art educators have different views of computer literacy. A number of art educators have encouraged the use of computers in art curricula. Clark (1985) and Hubbard and Linehan (1983) have suggested that the computer be used for classroom management and for tutoring purposes in art history and aesthetic instruction.

McCulloch (1984) envisioned the role of the computer as an instructional aid, a management tool, and as an instrument for the creation of art, and it has been in the latter area that many art educators have lent their support (Boling & Hubbard, 1983; Clements, 1985; Hickman, 1990; O'Connell, 1985; Sasowsky, 1985, White, 1985). However, both the diversity and importance of these views may have been overrated. According to Klassen, Anderson, Hansen, and Johnson (1980), as well as to Hunter (1981), if the observer adopts the perspective that computer literacy is a matter of functioning effectively within a given role, then it becomes more obvious why some people can exist at lower levels of understanding while others require more sophisticated understanding

For the proposed study, the perspective of computer literacy provided by Anderson and Hunter (1986) offers a utilitarian point of view:

> Computer literacy is best defined as whatever computer knowledge and skills one needs to function effectively in a given role. This includes the ability to evaluate appropriate use of computers, to plan and execute various applications of computers, and most importantly, the ability to understand how computers are impacting us socially, psychologically, culturally and ethically. (p. 131)

Impact of Computers in Art and Design Education

The word "design," according to the *Webster's New World Dictionary of Computer Terms* (Darcy & Boston, 1983), means to plan or contrive. However, design has been attributed a far wider frame of reference in the present information-based, high-technology society, representing different things to different people. Koberg and Bagnal (1991) indicated that design was the process of creative problem solving in human behavior. According to Bevlin (1977), design is the organization of parts into a coherent whole, or the exercise of a series of decisions, formulated to arrive at the one best solution. In practical terms, Papanek (1973) stated that design is the effort to plan a meaningful order.

Design is the product of creative problem solving activities that individuals or groups, including architects, engineers, craftsmen, artists, and entrepreneurs, direct toward the best problem solutions within given guidelines or limitations (Bayley, 1985; Hanks, Belliston, & Edwards, 1978). "To design" can imply a wide range of activities, from the simple to the complex and sophisticated. Papanek (1973) and Bevlin (1977) were in agreement that everyone is a designer, thus design is considered to be a basic aspect of human life and activities. However, although everything fabricated by humans is designed, not everything can be

considered to be well-designed. Good design is evident when the final product is functional while providing aesthetic qualities. According to Bayley (1977), little effort had been devoted to the development of a theory of design. However, modern design theory, just as design in practice, no longer involves only an aesthetic process, but is moving toward an understanding of human social contexts as well.

A review of the literature concerned with the use and impact of computers in art and design education provides evidence of a diversity of viewpoints. Each designer possesses some form of visual problem solving skills, and it is difficult to deny that some individuals accomplish this better than others (Hanks et al., 1978; Papanek, 1973). According to Koberg and Bagnall (1991), the more the designer understands the process of creative problem solving, the more interesting and meaningful the results will be. Computer technologies have come to play an increasingly important role in the design process, to the point of influencing how the designer thinks (Lawson, 1980). However, according to Hiesinger (1983), computer technology cannot replace creative human thinking skills since the machine cannot think or differentiate between routine and creative approaches. Thus, the computer can only be used as a tool for the solution of creative problems within the design process. From the creative aspect, the design process has not changed from what it was in the past; the creative

problem solving process remains the basic component, regardless of the nature of the materials and technologies used by the designer.

Current evidence indicates that designers will become increasingly involved with the computer technologies. Whitney (1985) noted that computers basically help designers by providing the support and organizational capacity that allows a designer to fit together elements of the design process. Ettinger and Rayala (1980) identified three impacts that computers have had upon art and design education: 1) as media used within the art studio environment; 2) as research and instructional tools for teaching art history and art appreciation; and 3) as tools for classroom management, including the maintenance of student records and supply inventories. Modern computers can also be used as vehicles for the solution of visual problems, allowing artists and designers to experiment with ideas placed before them on a computer monitor.

Madeja (1983) indicated that design education should encourage the use and development of new visual languages created by electronic and computer technology. However, Lawson (1980) has cautioned that the successful designer must have not only a sound knowledge of the technologies relevant to the field, but also artistic awareness of design elements and principles. The creation of a design is the single most important element in the visual arts and is centered upon the individual designer's creative and visual

problem solving processes. Thus, it is not sufficient to be technically competent in the absence of developed aesthetic capabilities. Hiesinger (1983) cautioned that design could only be taught by moving to the heart of a specific problem to be solved; thus design education must remain practical since the analysis of realistic problems is the only way to find useful solutions.

Impact of Computers Upon Art and Design Professionals

The graphic designer is an individual who has a working knowledge of graphics, layout typography, the printing process, and photographic methods (Levin, 1961). Graphic designers work in a variety of media, and their future in education has been directed increasingly toward the uses of computer technology. In western societies at present, computer-aided design is no longer simply a concept and many designers have accepted computers as tools, replacing hand labor in the repetitive aspects of the design process (Lawson, 1980; Whitney 1985). .

Whitney (1985) indicated that the main focus of computers in art and design would be more than just the utilization of computers as art and design tools. To fit into the context of the information environment, artists and designers must use computer technology intelligently with clear understanding of the tasks for which it can be used.

Thus, computers can be used as tools to help artist and designers analyze, organize, and evaluate information, serving as key instruments in the thinking process. The result will be a rapid production speed increase, as well as a craft in which art work can be erase, restored, analyzed, and modified with great depth and precision (Hiesinger, 1983). It is incumbent upon artists and designers to adapt this computer technology to the end of expressing and creating new art forms and ideas. According to Meggs (1983), the need for clear and imaginative visual communications to relate people to their cultural, economic, and social lives has never been greater.

Gallup (1984) stated that computer technology would have a great impact on the future of life in the United States. Artists and designers would use the computer as a design tool since it would allow them to explore their own imaginations and create new designs far beyond the capabilities of traditional tools. Difficult tasks that could not in the past be challenged, would be undertaken as both the speed and range of the designers work passed beyond traditional barriers (Bickford, 1983; Heisinger, 1983). Lineham (1983) stated that the computer is here to stay because it has made it possible for artists and designers to create images that once could be found only in their dreams, a sentiment to which any number of authorities in this field have indicated agreement (Lewell, 1985; Madeja, 1983).

Therefore, numerous artists and designers have indicated their readiness to accept computers not just as tools, but even as replacements for traditional tools. This search for new forms, materials, and tools has led artists and designers to explore many branches of technology with interesting results. Progress in this professional field has been summarized by Coan (1989):

> The development of computer graphics as two- and three-dimensional tools and for manipulation of images during production stages of commercials and printed matter will continue. Computer graphics become deeply established in processes where they save time in extremely deadline-department business, such as magazine production, where last minute changes are the rule. The pressure to produce mechanicals on a tight deadline for client approval and then for printing is matched by the pressure for quality. The quality norms in these fields are the highest possible, specially, the sharpness and selection of type, the matching, richness and variety of color, and simply stated, the accuracy of getting what the designers intends out of the computer system. (pp. 61-62)

Future of Computer Technology in Art and Design

Presently, artists and designers are faced with the development and implementation of computer technology as well as the integration of new materials into their work. The computer can function for artists and designers at many different levels. Artists have only to choose what role they wish the computer to play, and have indicated that they will allow the computer to function as an idea ma-

chine. Frank (1979) predicted that more artists and designers would head toward the large-scale utilization of machines for the creation of art, but that computer art must be differentiated from the many artistic styles and fashions of the past. Frank indicated that the entry of the computer into art was a technical process equally as irreversible as the introduction of the machine into the manufacturing production process.

The computer will help artists and designers develop new art and new perceptions in a realm of nearly unlimited possibilities. Each new program functions virtually as a new set of tools and the type and quality of work produced will be dependent both on the artist who uses the machine and program capabilities. This future, as well as reservations about the use of computers in art, was summarized by Murray (1976):

> For many the computer seems not only to limit the artist's intuitive response to his own unfolding creation, but also prevents him from leaving any personal trace in the execution of the work. Granted he can devise a program uniquely suited to a particular artistic conception, and can accept, reject, or modify the image as it emerges on the screen. He can even vary the quality of line and introduce a variety of coloristic effects. Yet somehow all this seems limited when measured against an "oldmaster" drawing, in which every line and every nuance directly reflects its creator's individual response to the medium. However, to consider computer-generated graphics in this light is to remove them from their proper artistic context. Like so many "conceptual" works of the past several years, the creative process is centered not in the execution of the work, but in the artist's mind as he conceives the idea for a piece. (p. 3)

More recently, Riley (1984) indicated that artists and designers who know how to use computers will have a different set of skills from those who have only computer skills or design skills. Palyka (1976) encouraged the concept of artists who use computer programming as a tool to help with the creation of images. However, artists must communicate and define their ideas in sufficient detail to enable understanding of their artistic requirements by computer programmers. If this is not the case, then the end result may not even resemble what the artist had sought to achieve. Gottschall (1982) stated that the computer itself would be unable to create art or designs without human creative input. However, according to Aldrich-Ruenzel (1983), the computer would allow artists and designers to achieve greater creative thought without losing the sense of their work.

Though the gap between the fine arts and computer technology has been considerably narrowed in recent years (D. Foster, personal communication, 1992), Lewell (1985) stated that at the beginning stage of hardware and software development, some of the primary benefits of the computer had no relevance to the fine arts. In comparison to the realm of graphic design and illustration, the speed that computers can achieve is not always essential in the fine arts, where no task is strictly a routine task. In addition, computers are difficult to master and have little use until they are given specific tasks to perform. Further-

more, there is also danger that this complex technology will serve to distract artists from their craft as they struggle to master the tools of this new approach.

Like most technological developments, the benefits of computer art and design are often counterbalanced by an equally important set of disadvantages. There is also strong agreement on certain non-technical artistic skills that are not necessarily related to computing. As well as skills in the arts and graphics, design professionals must reflect certain skills in personal communication, management, writing, presentations, and financial management, to which now must be added the development of the knowledge of computer operating systems and, in some cases, programming languages (Computer Graphics, 1989). It is inevitable that these shifts in attitudes, will be followed a corresponding change in the professional image of the artist. At the very least, designers and educators may in the future be required to do some degree of programming.

The disappearance of the distinction between the producers of fine and applied arts appears to be of far greater impact. However, it would seem likely that we are witnessing the emergence of a new and exceptionally important area of activity centering upon the visualization of information.

Development of Art Education in Thailand

The development of art education in Thailand began early in the 14th century, or the Thai *Sukhothai* period. The basic training was in the form of non-traditional education, acquired by students learning from work with older masters. At the time, art and design education was rooted in the Buddhist religion. By the early 15th century, during the *Ayutthaya* and early Bangkok periods, formal art education was initiated in Thailand. *Chang Sib Mhoo*, or the 10 disciplines of traditional Thai craftsmanship, was the basis for the traditional education of Thai artists. The basic training of artists started with the phrase, "curve makes a circle; straight makes lines" (Jamuni, 1988, p. 58). Students practiced different kinds of line drawings, then the teacher would determine whether the students should proceed to more sophisticated work. The trainee had to draw ornamental patterns which contained human and animal figures in classic Thai styles. The most important difference between the Thai and western styles of training is that Thai trainees did not use three-dimensional objects as models or sources, but copied pictures from manuscripts.

Modern education, including art education, began in the 19th century during the reign of King Chulalongkorn. A school for civil servants was founded which later became Chulalongkorn University. A number of British teachers were hired by the Ministry of Education, and a national

curriculum was established and distributed throughout the country. The curriculum consisted of four areas of study: 1) mathematics, science, geography, and history; 2) ethics and religion; 3) physical education; and 4) the arts and crafts.

Arts and crafts courses consisted of drawing, painting, pottery, and handicrafts. Because of changes in the general education curriculum, the first art school, Pohchang, was founded in Thailand in 1913 and focused upon the education of arts and crafts teachers for primary and secondary schools (Jamuni, 1988). Although the primary goal was not to train artists, graduates were required to demonstrate artistic skills as well complete general education requirements. Graduates earned certificates with a status lower than that for standard bachelor's degrees.

Art training at the Pohchang School was intended to enable teachers to create works in both western and Thai styles. The curriculum was composed of professional art studies, including drawing, painting, sculpture, art history, and design, as well as general subjects such as literature, English, science, and mathematics. Recently, the Pohchang School has become an institute of higher education offering bachelor's degrees in fine arts, industrial art, design, and art education. The official title of the school was changed initially to the College of Arts and Crafts, as placed under the direction of the Department of Teacher and Vocational Training of the Ministry of Educa-

tion (Pohchang School, 1986). This college was subsequently reorganized as the Faculty of Fine Arts of the Rajamangala Institute of Technology (Taylor, 1991).

The Silpakorn School, or the School of Fine Arts, was founded in 1933 and within 10 years became the School of Painting, Sculpture and Graphics Art of Silpakorn University, placed under the direction of the Ministry of University Affairs (Wong-Uparaj, 1978). The primary purpose for the establishment of the Silapakorn School was to preserve national art treasures and to support art and cultural activities in Thailand. The curricula developed at the school emphasized painting and sculpture as well as printmaking, and allied subjects in studio art training including anatomy, composition, drawing, design, perspective, visual problem solving, art history, aesthetics, and art criticism. In 1956, Silpakorn University added various majors and departments, including architecture, the decorative arts and communication design, and archaeological conservation. The art and design courses are taught specifically within each specialized discipline (Jamuni, 1988).

At present, there are at least 40 public and private higher educational institutions under the authority of the Ministry of the University Affairs or the Ministry of Education which offer programs in the fine arts, design, or art education. The arts and design curricula vary among the different institutions. However, many universities in

Thailand use the Silpakorn University curriculum as a model since it is considered to be a prototype and the pioneer school of design and fine arts in Thailand. Thus, many graduates from Silpakorn University teach and/or administer a number of art programs across the nation. The foundation classes for all art and design programs in Thailand are quite similar. The emphasis is placed upon basic design, drawing, color theory, composition, and visual problem solving. From 135 to 183 semester credits are required for bachelor of fine arts or bachelor of art in art teaching degrees (Taylor, 1991).

Computers in Art and Design Education in Thailand

In general, higher education institutions are the only establishments that offer courses in computer education (Computers and Thailand in the Future, 1984). Although computers were introduced in Thailand nearly 20 years ago, at both Chulalongkorn University and the National Statistical Office, computer education has been taught at the university level only since 1984 and is currently offered in the engineering fields, departments of computer science, and in applied computer and statistics programs (Sunthanapun, 1984).

At present, most Thai universities have computing centers to serve administrators, faculty, and students. The

growing use of computers in education has been witnessed by increased amounts of governmental support (Jungsakul, 1984). Thailand is rapidly expanding its capacity to absorb computer applications and increasing numbers of Thai students are required to take computer-related or computer literacy courses. Thus, the universities of Thailand are the principal resource for the provision of formal computer education and training and computers are closely associated in the public mind with the university system. In most cases, the purchase of computers was justified on the basis of their ability to contribute to the sciences and to applied science fields, but as their potential has been realized they have been increasingly put to use in other areas.

In the late 1980s, several faculty members of the Faculty of Fine and Applied Arts at Chulalongkorn University became interested in computer-aided art. Most of these faculty members had attended American institutions for graduate work and were determined to integrate computers into the design courses at their own schools by initially including computer art as a unit within existing courses (Disatapundhu, 1989b). Eventually, this unit developed into a full-term course and was taught on an experimental basis.

Since progress in computer applications in art, and especially in the graphic arts and music fields, has been rapidly achieved, Chulalongkorn University has placed greater emphasis on this new technology and institutional

budget priorities have witnessed a major shift in the direction of academic computer support. Therefore, in 1990, the Faculty of Fine and Applied Arts at Chulalongkorn University created its own computer laboratory. The facilities for the lab were considered to be among the first of its kind in Thailand. The purpose of this facility was designed to serve the expanding needs of the fields of commercial art and the fine arts in the area of computer graphics. Specialties include desktop publishing for variety of businesses, animation, and slide design for academic and industrial purposes. The courses offered are designed to prepare students for careers in the fine arts as well as the commercial arts.

Production practices for art and design-making have changed in Thailand. The type of artistic tools and equipment used by artists or designers has changed from paper, pencils, and paints to electronic tools accessed through computer equipment. However, the methodologies used for the creation of art have remained basically the same. For example, in the past, painting referred to free-handed applications of brushes dipped in a colored, liquid substance to paper or board surfaces. In more recent times, the term painting can refer to the use of a computer for free-hand sketching with such devices as a stylus, or by means of keystrokes on monitor displays where a menu is used to select or change line width, brush shape, and/or color electronically.

It is incumbent upon art and design educators in Thailand to prepare for further changes in this direction. Presently, a number of viewpoints as well as ideologies have had an impact upon art and design education. Change and the introduction of new technologies to both artists and designers are the forces that are changing the face of art and design in Thailand.

CHAPTER 3

METHODOLOGY

The purpose of this study was (1) to investigate the use of computer technology in the fields of graphic design in Thailand, and (2) to identify present and future patterns of computer use among graphic design educators, students, and professionals. Descriptive data were gathered for the purpose of formulating guidelines and recommendations for the future development of the graphics design curriculum at the Department of Fine and Applied Arts at Chulalongkorn University, Thailand, and for the future development of training and retraining programs for graphics design educators, students, and professionals in Thailand.

This study was based upon the use of curricular needs assessment techniques to arrive at a useful and valid set of guidelines for the enhancement of the integration of computer technology into graphic design programs, and to provide a foundation for future curriculum requirements in the field of graphics design education. As recommended in English and Kaufman (1975) and by Kaufman (1975), the survey questionnaire method was used as the basis for data collection.

The methodological procedures for this study are presented in this chapter in four principal sections: 1) population and research sample, 2) design of the data collection instrument, 3) the data collection procedure, and 4) methods of statistical analysis.

Population and Research Sample

The population for this study consisted of three target groups in Thailand. The first group consisted of all full-time graphic design educators actively teaching graphics design courses in departments of fine arts and design, subject to the authority of the Ministry of Universities and Institute of Technology Affairs. These departments were from Bhurapa University, Chulalongkorn University, Chiangmai University, the Rama IV Institute of Technology, Chao Khoon Ta-Harn campus, Rangsit University, Silpakorn University, and Srinakarinwirot University. Furthermore, this group also included a group of full-time graphics design educators from teacher colleges and the Rajamangala Institute of Technology, which is subject to the Ministry of Education and listed by the Department of Educational Statistics (Ministry of Education, 1992).

The second group consisted of all third- and fourth-year students enrolled in computer graphics classes at the Department of Fine and Applied Arts, Chulalongkorn University. Finally, the third group consisted of all graphics

design directors currently employed in professional fields by firms as listed in the Thailand Advertising Directory (Maritanakorn, 1992).

Design of the Data Collection Instrument

The development of the questionnaire used for data collection was based upon the following procedures: 1) identification of an expert panel to verify the validity of the objectives; 2) provision of construct and content-related evidence to ensure the validity of the survey instrument (Cunningham, 1986); and 3) pilot testing of the survey instrument to determine its reliability.

The questions for the first draft research instrument, with a Thai population in view, were selected and modified from an instrument created for the ACM SIGGRAPH Education Committee Survey by Keith (1989). Questions, as modified, were used with the verbal permission of the author (S. Keith, personal communication, April 2, 1992). All questions were initiated to match the research objectives by knowledge derived from the review of research related to this study, appropriate textual materials, and articles concerned with the utilization of computers and related technologies in the fields of art and design.

The draft research instrument developed for this study consisted of a survey questionnaire (Appendix A). The initial two-part questionnaire was constructed in accordance

with guidelines outlined by Dillman (1978). Part I was designed to obtain specific personal information about each respondent and consisted of 14 items. The first four questions gathered demographic data. Questions 5 through 14 addressed subjects' opinions on (1) computer utilization, (2) obstacles which currently inhibited computer utilization, (3) training and retraining needs for enhanced computer utilization, (4) the ethics of computer use within the fields and professions reflected within the population, (5) the advantages of the use of computers in the arts and design fields, and (6) the uses of computers for artistic applications or as part of the curricula of advertising art design.

Part II of the survey instrument consisted of questions to which subjects were asked to respond based upon a 5-point, Likert-type interval scale with the following rating options: 1) not important, 2) important, 3) not sure, 4) very important, and 5) extremely important. The purpose of the second part of the questionnaire was to determine which computer and skills and levels of knowledge each respondent believed to be requirements for present and future career progress in the respondents' fields and professions. Open-ended questions were included at the end of Part II to allow participants to submit comments which would otherwise not had been encompassed by the survey questions.

The pilot survey questionnaire was prepared in English and was reviewed by a panel of six experts selected by the investigator from the Department of Art, Oregon State University and the Department of Fine Arts, University of Oregon, as well as graphics design professionals employed at studios in Corvallis, Oregon. Each panel member was asked to verify content-related evidence to ensure the validity of the instrument (Cunningham, 1986). The following criteria were utilized for the selection of expert panel members:

1) Panel members must have comprehensive understanding and awareness of the principles of graphics design and of computer graphics capabilities.
2) Panel members must have educational work experience, or must have been employed as graphics design professional for a minimum of five years; in either case, panel members are required to be currently employed in their field or profession.

Each expert panel member was contacted personally. The panel members were asked to review all survey items based upon appropriateness and the degree to which each item was in alignment with the respective objectives for this study and the administration of the survey. Items found ambiguous were rewritten or replaced until such time all of the expert panel members found the instrument to be satisfactory. The English version of the questionnaire was then translated into a Thai version by the researcher.

The final questionnaire was translated into the Thai language and was reviewed again by seven Thai experts nominated by the Academic Committee, Faculty of Fine and Applied Arts, Chulalongkorn University (Appendix B). The purpose of this expert panel was to verify content related-evidence to ensure the validity of the instrument (Cunningham, 1989). Thai expert panel members were contacted by the Department of Creative Arts, Chulalongkorn University. A preliminary meeting between the researcher and the expert panel members was held at the Department of Creative Arts, Chulalongkorn University, for the purpose of sharing ideas and discussing computer utilization in fields of graphic design in Thailand. On June 22, 1992, the instrument in both Thai and English language versions, accompanied by a cover letter in the Thai language, was forwarded to each member of the panel for his or her reaction.

Thai panel members were asked to review all items based on appropriateness and their degree of alignment with the respective objectives for the survey. The contents of the questionnaire were reviewed by Thai panel of experts. At the same time, both the Thai and English questionnaire versions were reviewed for parallel Thai and English interpretations that were readable as well as clear with respect to meaning.

Following this review procedure, in accordance with recommendations from the Thai committee of experts, the survey instrument was modified into a three-part question-

naire (Appendix C) considered to be appropriate for the Thai environment and subjects. Part I of the questionnaire was designed to obtain specific personal information about each respondent and consisted of 15 items. The first six questions of Part I of the survey questionnaire were directed at the demographic data of the respondents. Question 7 determined respondent levels of computer preparation, whereas questions 8 and 8.1 determined the degree of the use of computers in the present and future. Question 9 determined how respondents acquired their computer training and question 10 was directed at the respondents' frequency of computer utilization. Questions 11 and 12 were directed at the types of computers used by the respondents and their knowledge of application area(s). Question 13 determined the major obstacles that may have inhibited respondent computer usage and question 14 was directed at training and retraining needs for enhanced computer utilization necessary for respondents' present and future jobs. Finally, question 15 determined the advantages of the use of computers in the fields of graphics design.

Part II of the survey instrument was designed to elicit respondents' opinions. Question number 1 in Part II was used to obtain specific opinions of the degree to which respondents supported the use of the computers in their professions. Question 2 was directed at respondent opinions of the use of computers as part of arts and graphics design curricula, whereas question 3 determined support for

instruction in the ethics of computer use as a content area within arts and graphics design curricula.

Part III of the survey instrument consisted of 16 question items directed at the determination of which computer skills and levels of knowledge each respondent believed to be requirements for present and future career progress in the respondents' fields and professions. A five-point Likert-type interval scale was used as the basis for responses.

A total of 10 items were revised or added to the sur vey questionnaire, as follows:

- Item 3, knowledge of operating system and utilities (i.e., DOS, MS-DOS, UNIX, Macintosh);
- Item 8, hands-on experience on more than one computer system;
- Item 9, use of vector graphics techniques (i.e., CAD/CAM and drawing programs);
- Item 10, use of raster graphics techniques (i.e., paint programs);
- Item 11, use of 2-D computer graphics;
- Item 12, use of 3-D computer graphics;
- Item 13, use of 2-D computer animation techniques;
- Item 14, use of 3-D computer animation techniques;
- Item 15, use of video graphics techniques; and
- Item 16, use of project management software.

Open-ended questions were included at the end of Part III to allow the subjects to submit comments which otherwise

would not have been encompassed in responses to the survey questions. At the end of the survey instrument, the respondent could fill in his or her name and address if they wanted to obtain a copy of the results. Items which were found to be inappropriate were replaced and/or revised by the expert panel until such point the instrument was viewed as satisfactory for pilot testing.

Pilot testing of the questionnaire was conducted to obtain information on the reliability of the instrument. The pilot survey was conducted prior to the administration of the survey instrument to the three population groups considered. Participants in the pilot group consisted of: 1) full-time graphics design educators, selected from lists designated by appropriate academic departments, from Bhurapa University, Chulalongkorn University, Chiangmai University, the Rama IV Institute of Technology, Chao Khoon Ta-Harn campus, Rangsit University, Silpakorn University, and Srinakarinwirot University, and full-time graphics design educators in teacher training colleges and the Rajamangala Institute of Technology, selected from lists designated by the Department of Educational Statistics of the Ministry of Education Affairs (Ministry of Education, 1992); 2) third- and fourth-year students enrolled in computer graphics classes offered by the Department of Fine and Applied Arts, Chulalongkorn University (i.e., the only Thai university that offered computer graphics courses within arts and design programs at the time of testing; and 3) graphics

design directors currently employed by professional firms, as listed in the Thailand Advertising Directory (Maritana-korn, 1992).

A table of random numbers was used to select 15 individuals from each group within the population. The stability and/or reliability of the instrument was established by the test-retest method. Each member of the pilot groups was contacted and was asked to test twice at intervals of approximately two weeks. The results from the tests and retests were then correlated between items to obtain an estimation of stability and/or reliability, using the Pearson *r*-correlation formula to determine the consistency of test items (Nie, Hull-Jenkins, Steinbrenner, & Bent, 1975). The result of the Pearson product-moment *r*-correlation coefficient was .975, which was believed to be a satisfactory standard.

The final survey instrument was subjected to a test of reliability using the data gathered from the 280 research population respondents. The data were statistically analyzed using the procedure developed by Hoyt and Stunkard (1952). The scores for 16 Likert-type scale item responses for Part III of the survey instrument were judgmentally assigned by the sample respondents utilizing an analysis of variance (ANOVA) procedure. This procedure provided a straightforward solution to the problem of establishing the reliability coefficient for unrestricted scoring items. Schematically, the matrix was as follows:

Competencies	Subjects					
1	1	2	3	j	Total	TN
1	Y11	Y12	Y13	Y1J	Y1	TN
2	Y21	Y22	Y23	Y2J	Y2	TN
3	Y31	Y32	Y33	Y3J	Y3	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
I	YI1	YI2	YI3	YIJ	YI	...
...	...	...	...	...	...	...
...	...	...	...	...	...	...
K	YK1	YK2	YK3	YKJ	YK	TN
Total	Y.1	Y.2	Y.3	Y.J	Y.	TN

A two-way ANOVA was used to calculate sums of square values for subjects and items; the residual sum of the squares was obtained by subtraction. The estimate of reliability was obtained according to the following formula:

$$\frac{\text{Mean Square Subject} - \text{Mean Square Residual}}{\text{Mean Square Subjects}}$$

A Hoyt and Stunkard test was completed for the 16 Likert-type scale item responses to the survey instrument. The overall reliability coefficient was .832. The survey instrument was deemed to be both stable and reliable.

Data Collection Procedures

The final survey instrument was administered to the selected population sample accompanied by a letter of

transmittal in the Thai language. Based upon the guidelines suggested by Dillman (1978), the cover letter (Appendix D) explained the purpose of the request and the procedure for completion of the questionnaire, which was then distributed by mailings (1) to graphics design educators at Bhurapa University, Chulalongkorn University, Chiangmai University, the Rama IV Institute of Technology, Chao Khoon Ta-Harn campus, Rangsit University, Silpakorn University, and Srinakarinwirot University, from lists designated by appropriate departments, and full-time graphics design educators at teacher training colleges and the Rajamangala Institute of Technology, from lists as designated by the Department of Educational Statistics of the Ministry of Education Affairs (Ministry of Education, 1992); and (2) to graphics design professionals currently employed in this field in Thailand from names indicated in the Thailand Advertising Directory (Maritanakorn, 1992).

The survey instrument was distributed directly by the researcher to the third population sample, third- and fourth-year students enrolled in computer graphics classes at the Department of Fine and Applied Arts, Chulalongkorn University. In each case, participants were requested to answer all questions and to return the survey to the investigator in a post-paid return envelope supplied with the distribution. The survey instruments returned by respondents were coded individually by number for follow-up mail to nonrespondents. The letter of transmittal assured all

respondents that their responses would be held in confidence.

To increase the rate of response, follow-up letters (Appendix E) were mailed to those who had not responded within two weeks following the initial mailing. After a time lapse of one additional week, a duplicate instrument with an appropriate reminder cover letter (Appendix F) was mailed to individuals within the population who continued to be nonrespondents.

Methods of Statistical Analysis

The data obtained from administration of the survey instrument were processed and analyzed using the *Statistical Package For Social Sciences* (SPSS/PC+) at Oregon State University, Corvallis, OR. The statistical techniques employed for purposes of data analysis were administered as follows:

1) Since this investigation was concerned only with population means, and percentages were needed to address the research questions, frequency distributions, percentages, and cross-tabulation procedures were used as the appropriate statistical procedures.
2) A 3 x 2 contingency table chi-square test was used to determine whether there were significant differences in computer usage among graphic design

educators, students, and professionals in Thailand.

3) A one-way ANOVA was used to compare differences between the means for different subject populations considered for this study. When significant interactions between any two groups were determined to exist, the Newman-Keuls procedure was applied to the appropriate data.

CHAPTER 4

ANALYSIS OF THE RESULTS

The purpose of the present study was to:

1) investigate the of use of computer technology in the field of graphic design in Thailand, and
2) to identify present and future patterns of computer usage among educators, students, and graphic design professionals in Thailand.

A discussion of the results obtained from the computation and analysis of data collected, based upon the research questions considered in Chapter 1, is presented in this chapter. The research questions were presented as follows:

1) To what degree do graphic design educators, students, and professionals in Thailand support the use of the computers in their professions?
2) What is the frequency of computer use among graphic design educators, students, and professionals in Thailand, and are the differences in the frequency of use among the three population groups significant?

3) In what ways are computers currently used among graphic design educators, students, and professionals in Thailand?
4) Do graphic design educators, students, and professionals in Thailand support the use of computers within art and design curricula?
5) Do graphic design educators, students, and professionals in Thailand support the integration of a standard of ethics for the use of computer technology as part of the art and design curricular content?
6) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what advantages are likely to result from the increased utilization of computer technology ?
7) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what obstacles are perceived as the principal barriers inhibiting the utilization of computers in graphic design fields?
8) Among graphic design educators, students, and professionals, what types of computer knowledge and skills are perceived as essential for the present and future development of graphic design fields?

This study was focused upon three population groups. The first group was composed of full-time graphic design educators in departments of fine and applied arts, as listed by the Ministry of Universities and the Institute of Technology Affairs, and the Ministry of Education. The second was composed of third- and fourth-year students enrolled in computer graphic classes at Chulalongkorn University. The third group was composed of graphic design directors in professional business positions, as listed in the Thailand Advertising Directory (Maritanakorn, 1992). Note that in the tabular presentations, this group will be identified as "professionals."

Table 4-1 presents the response rates among the target population. Of the total of 553 survey questionnaires distributed or mailed, 140 were mailed to full-time graphics design educators, of which 67 subjects returned fully complete and utilizable responses (48% response rate). The researcher personally distributed 63 questionnaires to the third- and fourth-year students enrolled in computer graphics classes at Chulalongkorn university. The utilizable response rate for this group was 100 percent. In addition, 350 questionnaires mailed to graphic design professionals, of which number 150 subjects returned utilizable responses (42.8%). Thus, the overall utilizable response rate was 50.6 percent. Frequency statistics by population group are also given in Table 4-1.

Table 4-1. Summary of Survey Responses.		
Category Label	Response Frequencies	Percentages
Educators	67	12.1
Students	63	11.4
Professionals	150	27.1
Did not fit study requirements	94	17.0
No response	179	32.4
TOTAL	553	100.0

Among the three target groups, some degree of bias was clearly indicated. It may be speculated that neither educators nor students had sufficient computer knowledge to fully respond to the survey questions. Moreover, graphics professionals may not have had enough time or sufficient computer knowledge to fully respond to the questions.

Analysis of Responses, Part I

Responses to Part I of the survey questionnaire, concerned with personal and background information, revealed that the majority of the respondents (67.5%) were males (Table 4-2). The student group was the only exception to this proportional relationship, a finding which was anticipated in view of the predominance of males within professional ranks in this occupational classification.

In addition to gender, items related to occupational status and family status, experience, and educational backgrounds were also descriptively cross-tabulated by frequencies and percentages. The relationship between occupa-

Table 4-2. Sex and Occupational Status.				
Sex	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)	Totals
Males	47 (70.1)	35 (55.6)	107 (71.3)	189 (67.5)
Females	20 (29.9)	28 (44.4)	43 (28.7)	91 (32.5)
Total	67 (100.0)	63 (100.0)	150 (100.0)	280 (100.0)

tional and family status is presented in Table 4-3. The fact that none of the student group were or had been married was a reflection of regulations at Chulalongkorn University which prohibits enrollment by married students in programs at the bachelor level. It should also be noted that a greater proportion of the professional group indicated single status than educators. This trend is possibly related to the nature of the work, working conditions, personal responsibilities, or other differences between these two professional classes.

Table 4-3. Family and Occupational Status.				
Label	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)	Total Freq (%)
Single	24 (35.8)	63 (100.0)	118 (78.6)	205 (73.2)
Married	42 (62.7)		31 (20.7)	73 (26.1)
Divorced	1 (1.5)			1 (0.4)
Other			1 (0.7)	1 (0.4)
Total	67 (100.0)	63 (100.0)	150 (100.0)	280 (100.0)

Table 4-4 presents a summary of the levels of experience among graphics design professionals and educators. The frequency distributions clearly indicate that the majority of educators reflected 10 or more years of professional experience, in contrast to nearly the reverse situation among graphics design professionals. The largest

number of respondents from this group reflected from none to three years of experience. It should also be noted that nearly all of the design professionals had fewer than 10 years of experience. The academic qualifications of these two professional groups are summarized in Table 4-5. Educators reflected a higher proportion of professional degrees than the employees of commercial firm, the greatest proportion of whom had earned bachelor's degrees.

Table 4-4. Frequency Distributions for Experience Among Educators and Design Professionals.

Category	0-3 yrs Freq (%)	3-5 yrs Freq (%)	5-10 yrs Freq (%)	10+ yrs Freq (%)	Total Freq (%)
Educators	10 (14.9)	17 (25.4)	16 (23.9)	24 (35.8)	67 (30.9)
Professionals	67 (44.7)	49 (32.7)	30 (20.0)	4 (2.7)	150 (69.1)
Total	77 (35.4)	66 (30.4)	46 (21.2)	28 (12.9)	217 (100.0)

Note: Students were not asked to respond to this survey question.

Table 4-5. Frequency Distributions for Academic Qualifications Among Educators and Design Professionals.

Category	Ph.D. Freq (%)	Master's Freq (%)	Bachelors Freq (%)	Associate or Other Freq (%)	Total Freq (%)
Educators	2 (3.0)	36 (53.7)	25 (37.3)	4 (6.0)	67 (30.9)
Professionals		16 (10.7)	114 (76.0)	20 (13.3)	150 (69.1)
Total	2 (0.9)	52 (24.0)	139 (64.1)	24 (11.0)	217 (100.0)

Note: Students were not asked to respond to this survey question.

A second viewpoint of educational background concerned with the departments through which the subjects had matriculated and graduated is summarized in Table 4-6 for the two largest categories considered in Table 4-5. The stronger representation of design professionals in the applied arts is noted, as well as in art education. In contrast, educators were more clearly identified with art

education than with the applied arts (i.e., graphics and visual communication, fine and applied arts).

Table 4-6. Distribution of Educational Backgrounds Among Professionals and Educators with University Degrees.

	Professionals Freq (%)		Educators Freq (%)	
Label	Bachelor	Master's	Bachelor	Master's
Advertising	1 (0.9)			
Art admin				1 (2.8)
Art education	16 (14.0)	1 (6.2)	10 (40.0)	15 (41.7)
Art history				1 (2.8)
Computer graphics		2 (12.5)		
Educational technology			1 (4.0)	
Fine/applied arts	34 (29.8)	13 (81.3)	5 (20.0)	19 (52.7)
Graphics/ visual comm	42 (36.8)		7 (28.0)	
Industrial arts	12 (10.5)		2 (8.0)	
Liberal arts	3 (2.6)			
Printmaking	1 (0.9)			
Total	114 (100.0)	16 (100.0)	25 (100.0)	36 (100.0)

Average incomes per month between the two income-earning groups, educators and graphics design professionals, is presented in Table 4-7. Among both populations, the percentage distributions placed 80 percent of those surveyed at salary levels of 20,000 *baht* or less per month, with only small percentages of each group achieving earnings in excess of this amount. Thus, salary differentials between the two groups were not substantial, other than to observe that a slightly greater percentage of privately employed design professionals could anticipate earnings in the ranges from 20,000 to 40,000 *baht* per month,

whereas the percentage of this type of employee placed in the lowest wage range was also slightly greater than for the academic employees.

Table 4-7. Distribution of Incomes Between Educators and Design Professionals.

Baht/Month	Educators Freq (%)	Professionals Freq (%)
5,000-10,000	21 (31.3)	57 (38.0)
10,000-20,000	34 (50.7)	63 (42.0)
20,000-30,000	4 (6.0)	14 (9.3)
30,000-40,000	2 (3.0)	11 (7.3)
40,000-50,000	4 (6.0)	1 (0.7)
50,000 or more	2 (3.0)	4 (2.7)
Total:	67 (100.0)	150 (100.0)

Note: Students were not asked to respond to this question.

Finally, Part I of the questionnaire included questions relative to computer training experienced and desired by the three population groups. Table 4-8 indicates that among the professional populations, which include educators and privately employed design personnel, a substantial majority had experienced none to little training in the uses of computers. Students were an exception. However, relatively few students stated that they had benefited from no computer training. What is noteworthy is that a substantial minority of design professionals did state that they had received moderate amounts of training, whereas less than five percent of the educator-professional groups attested to extensive training with computers.

Table 4-8. Distribution of Computer Preparation Among Educators, Students, and Professionals.

Category	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)
None	17 (25.4)	3 (4.8)	25 (16.7)
Little	29 (43.3)	41 (65.0)	51 (34.0)
Moderate	18 (26.9)	19 (30.2)	67 (44.7)
Extensive	3 (4.4)	--	7 (4.6)
Totals	67 (100.0)	63 (100.0)	150 (100.0)

The results of responses to question 14 (Part I), the types of training or retraining needed or foreseen by the subjects of this investigation, were not tabulated insofar as the subjects could respond to more than a single category and the totals for each group were greater than 100 percent. However, the overall results for the three target populations (Table 4-9, n=280) indicated that substantial majorities of the subjects, respectively, 70.7 and 87.9 percent, perceived a need for training in basic courses in computer operation or for computer training in specific art and creative tasks. Smaller minorities of subjects indicated a need for training in the use of computer languages (31%), in the use of administrative software packages (15%), or in the use of advanced software and hardware technologies (8.6%).

Table 4-9. Distribution of Training Needs Perceived by Educators, Students, and Professionals.

Category	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)	Total Freq (%)
1	49 (17.3)	23 (8.1)	126 (44.6)	198 (70.0)
2	45 (16.1)	50 (17.8)	151 (54.0)	246 (87.9)
3	32 (11.4)	27 (9.7)	28 (10.0)	87 (31.1)
4	19 (6.8)	4 (1.4)	20 (7.2)	43 (15.4)
5	10 (3.6)		14 (5.0)	24 (8.6)

Note: 1 = basic course training in computer operations; 2 = training for specific tasks (e.g., page layout, illustration, image processing; 3 = training in use of computer languages; 4 = training in use of administrative software packages; 5 = other (specify).
Percentage totals for each group greater than 100% since subjects responded to more than a single category of training needs.

Analysis of Responses to Research Questions

The basis for analysis of the results for the research question results is provided from responses to the questions included in Parts II and III of the survey questionnaire.

Research Question One

1) To what degree do graphic design educators, students, and professionals in Thailand support the use of the computers in their professions?

Comparison of the responses (Table 4-10) among the three groups indicated a similarity among supportive attitudes toward computers. In each case, majorities were in agreement with the time saving and the production efficiency qualities of computer applications to perform design

and graphics work. The exception was that both students and design professionals placed the consideration of reduced costs before those of either computers in relation to the enhancement of design creativity or appropriateness to the modern workplace. It should be noted that small minorities of these two latter groups (1.3% and 7.9%) did not support the use of computers in their present or future professions, and that eight percent of the design professionals did not support computers in that they could not serve as replacements for creative thinking abilities.

Table 4-10. Degree of Support for Use of Computers Among Educators, Students, and Design Professionals.

Category	Educators (%/rank)	Students (%/rank)	Professionals (%/rank)
Improved efficiency/time saving in studio	70 (1)	56 (1)	73 (1)
Increase quality/efficiency in completion of graphic work	25 (2)	21 (2)	34 (2)
Expand imagination and create opportunity for designer creativity	13 (3)	3 (4)	4 (4)
Appropriate for modern/current workplace	10 (4)	3 (4)	4 (4)
Reduce costs in graphic design processes	7 (5)	13 (3)	14 (3)

Note: Percentage totals greater than 100% insofar as subjects responded to more than a single category.

Research Question Two

2) What is the frequency of computer use among graphic design educators, students, and professionals in Thailand, and are the differences in the frequency of use among the three population groups significant?

The frequency and intensity distributions of computer use among the three populations surveyed are shown in Tables 4-11 and 4-12. It may be noted that a majority from all three groups indicated that they used computers in either their professions or in connection with their academic programs. Students used computers regularly. Even among those who stated that they did not currently use

computers, most of the respondents indicated that they planned to use computers in the future. Table 4-12 indicates that a majority of all three groups used computers only 10 or fewer hours per week. More than 40 percent of the graphics professionals used computers in their work for 20 or more hours per week (10 professionals, or 8.5%, indicated that they used computers more than 50 hours each week), in contrast to 17.5 percent of all educators who used computers for the same time each week. None of the students reported the use of computers for the same amount of time each week.

Table 4-11. Present and Planned Computer Use Among Educators, Students, and Professionals.

Category	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)	Totals
Yes	40 (59.7)	60 (95.2)	118 (78.7)	218 (77.9)
Not now, or in future	3 (4.5)	1 (1.6)	6 (4.3)	10 (3.6)
Not now, but yes in future	24 (35.8)	2 (3.2)	26 (17.3)	52 (18.6)
Totals	67 (100.0)	63 (100.0)	150 (100.0)	280 (100.0)

Table 4-12. Intensity of Computer Use Among Educators, Students, and Professionals.

Hours/Week	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)	Totals
1-5	15 (37.5)	20 (33.3)	28 (23.7)	63 (28.9)
5-10	10 (25.0)	30 (50.0)	25 (21.2)	65 (29.8)
10-20	8 (20.0)	10 (16.7)	17 (14.4)	35 (16.1)
20-40	6 (15.0)	--	25 (21.2)	31 (14.2)
More than 40	1 (2.5)	--	23 (19.5)	24 (11.0)
Totals	40 (100.0)	60 (100.0)	118 (100.0)	218 (100.0)

A 3 × 2 contingency table, chi-square analysis was used to determine whether the differences in the frequency use of computers among graphic design educators, students and professionals in Thailand were significant. Descriptive statistical analysis (Table 4-11) indicated there were highly significant differences in the use of computers among these three population groups ($p < .0001$). The comparisons were most sharply evidenced between educators and students: 40.3 percent of the former did not currently use computers, whereas 95.2 percent of the students did use computers.

From questions related to this research issue, Table 4-13 summarizes the sources of knowledge of computer use for the population considered. Evidence for the growth in acceptance of the computer as a work tool among graphic designers and artists in Thailand is present in the comparison between the two professionals populations (i.e., educators and designers) and the student group. At the time surveyed, nearly all students were presently acquiring knowledge of computers from formal education courses, whereas majorities of the professional groups stated that they had learned "on-the-job" or were self-taught.

Table 4-13. Sources of Computer Knowledge Among Educators, Students, and Professionals.

Category	Educators % (rank)	Students % (rank)	Professionals % (rank)
Self-taught	50 (3)	20 (2)	53 (2)
Formal courses	53 (2)	97 (1)	31 (3)
On-the-job	60 (1)	10 (3)	66 (1)
Workshop training/other	28 (4)	--	32 (4)

Note: Percentages total more than 100% since subjects responded to more than one category.

Research Question Three

3) In what ways are computers currently used among graphic design educators, students, and professionals in Thailand?

Information obtained from Part I, question 12, of the survey was computed for descriptive frequency and percentage statistics. The summaries of the results are shown in Table 4-14.

Table 4-14. Computers Uses Among Educators, Students, and Professionals.

Category	Educators % (rank)	Students % (rank)	Professionals % (rank
Art (draw/paint)	27 (5)	55 (2)	34 (2)
Publication/graphics	85 (1)	83 (1)	91 (1)
Image processing	8 (8)	2 (6)	16 (4)
Word processing	40 (2)	27 (3)	32 (3)
Animation	18 (6)	2 (6)	15 (5)
Multimedia	28 (4)	7 (5)	13 (6)
Spreadsheet/database	30 (3)	10 (4)	13 (6)
Simulation/other	5 (7)	--	5 (7)

Note: Percentages total more than 100% since subjects responded to more than one category.

The results indicated that publications and graphics areas constituted the largest portions of use within each of the target groups, followed by word processing among all groups and significant use by students for artistic purposes. As may have been expected, design professionals used their computers for purposes of image processing and animation to a greater degree than did the two academic groups. The significant finding was that educators and students used computers for purposes of spreadsheets and/or databases to a greater degree than the design professionals.

In an associated question, substantial majorities of both students (92%) and designers (89%) stated that the type of computer they used principally was the Macintosh, whereas approximately only one-fifth of the same groups stated that they were familiar with or used an IBM system. More educators (70%) were familiar with or used IBM systems than used a Macintosh system (60%). The use of other types of operating systems was less significant (i.e., 8% and 7%, respectively, of educators and professionals stated that they used either Silicon Graphics, Symbolics, Quantel Paint Box, Harriet, Harry, Cypher Vanice or Matisse work stations).

Research Question Four

4) Do graphic design educators, students, and professionals in Thailand support the use of computers within art and design curricula?

To measure responses to this question, subjects were asked to give reasons for their support or nonsupport of the use of computers within art and design curricula. The following list provides reasons given by the respondents:

1. Prepare students for a future career in the technological society.
2. Prepare students for a future development of software and technology.
3. Increase quality and efficiency in the completion of graphics work.
4. Enhance technological knowledge and hands-on experience.
5. Enhance creativity by means of aesthetic and experiential tools.
6. Expand designer creative ideas.
7. Increase efficiency in the classroom.
8. There are no computer graphics courses for artistic purposes offered in Thailand higher education institutions.

As shown in Table 4-15, the greatest numbers of respondents from each population group selected reason 1 as the principal basis for their support of an expanded com-

Table 4-15. Percent and Ranking of Support for Computer-Aided Arts and Design Curricula Among Educators, Students, and Professionals.

Item No.	Educators % (rank)	Students % (rank)	Professionals % (rank)
1. Prepare students for future careers	48 (1)	48 (1)	57 (1)
2. Prepare students for future technology	15 (3)	--	4 (6)
3. Increase quality of graphics work	15 (3)	10 (3)	21 (2)
4. Enhance technological knowledge	28 (2)	17 (2)	13 (3)
5. Enhance creativity from new tools	10 (4)	8 (4)	7 (5)
6. Expand designer creativity	1 (5)	3 (5)	9 (4)
7. Increase classroom efficiency	1 (5)	17 (2)	--
8. No computer arts & design courses	--	--	1 (7)

Note: The percentage totals were greater than 100 since subjects responded to more than one category.

puter arts and design curriculum. Design professionals constituted the population which responded positively to this statement by the largest majority (57%) among the three groups. Professionals were also the only respondents whom indicated any degree of support (1.3%) for reason 8, computer and technical training viewed solely as functions of professional positions. Overall, with exceptions among students and design professionals, reasons 2 through 4 were supported by from 15 to 28 percent of all respondents. Only four percent of the professional population indicated support for the preparation of students for future software and technological developments, whereas none of the stu-

dents found the same reason a compelling argument in favor of curricular changes. A substantial minority (17%) of the student population also supported reason 7, increased classroom efficiency, as their second-ranked reason for support of curricular change. These two exceptions should not be surprising since professionals could be expected to be less concerned with the preparation of future competitors for jobs and students could be expected to be more concerned with classroom management.

Table 4-16 summarizes responses to a related issue, the educational level supported by each population group for the inclusion of computer training into arts and design curricula. With the exception that substantial numbers of educators evidently favored computer education in the arts at the highest level, whereas a significant number of design professionals favored the institution of computer training during secondary school, the greatest majorities of all respondents favored computer arts and design programs in relation to baccalaureate studies.

Table 4-16. Support for Computer Arts and Design Curriculum at Level of Education Among Educators, Students, and Professionals.

Category	Educators Freq (%)	Students Freq (%)	Professionals Freq (%)
Elementary	--	2 (3.2)	7 (4.7)
Secondary	7 (10.4)	6 (9.5)	27 (18.2)
Bachelor	39 (58.2)	53 (84.1)	91 (61.5)
Master's	2 (3.0)	2 (3.2)	2 (1.4)
Other	19 (28.4)	--	21 (14.2)
Total	67 (100.0)	63 (100.0)	148 (100.0)

Research Question Five

5) Do graphic design educators, students, and professionals in Thailand support the integration of a standard of ethics for the use of computer technology as part of the art and design curricular content?

A clear majority (92.1%) of members of all three population groups supported the integration of a standard of ethics for the use of computer technology as part of the art and design curricular content. In addition, a majority of respondents supported instruction in standards of ethics for the issues of computer software copying, computer abuse, and plagiarism. However, a small minority (7.9%) did not support the question on the issue of software copying. Following cross-tabulations among educators, students, and professionals for descriptive frequency and percentage of support statistics, it was determined that there were no significant differences of view on this issue among the three populations.

Research Question Six

6) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what advantages are likely to result from the increased utilization of computer technology ?

The following results (Table 4-17), determined by percentages and rank order within the population, represent the advantages perceived by educators, students, and professionals for the uses of computer technology. Different rankings among the three population groups may have been related to differences in occupational status or in the working conditions specific to each group. Improved efficiency in the studio environment, improved quality and efficiency in the completion of graphic design tasks, and improved efficiency in the classroom environment were ranked 1, 2, and 3 by educators, among whom support ranged from 87 to 63 percent.

Table 4-17. Comparison of Advantages of Use of Computer Technology Among Educators, Students, and Professionals.

Item No.	Educators % (rank)	Students % (rank)	Professionals % (rank)
1. Improved efficiency in studio	87 (1)	81 (1)	92 (1)
2. Improved efficiency in classroom	63 (3)	68 (3)	7 (5)
3. Improved quality/efficiency for graphic design	78 (2)	75 (2)	84 (2)
4. Maintain personal/inventory records	34 (4)	13 (5)	19 (3)
5. Better prepare for career opportunities	16 (5)	41 (4)	16 (4)
6. Other	--	3 (6)	--

Note: The percentage totals were greater than 100 since subjects responded to more than one category.

Among the educators, 34 percent agreed that computers helped them to maintain personal records and supply inventories, whereas only 16 percent of both the educators and the professionals felt that computers would help them to

better prepare themselves for future career opportunities. Note that 41 percent of the students perceived computer knowledge from the viewpoint of career preparation. In addition, 63 percent of the educators and 68 percent of the students were in agreement that computers would improve classroom efficiency, whereas only seven percent of professionals perceived this as an advantage of computer use. This was a logical position since the professional population could be presumed to have little interest in classroom outcomes.

Research Question Seven

7) From a comparative point of view, among graphic design educators, students, and professionals in Thailand, what obstacles are perceived as the principal barriers inhibiting the utilization of computers in graphic design fields?

Percentage and rank order were used to evaluate responses to this question. The descriptive statistics indicated several differences in rank order for obstacles to the utilization of computers in graphic design fields among the three population groups. As shown in Table 4-18, substantial majorities of educators, students, and professionals selected different responses, respectively, lack of budget, lack of computer availability, and lack of opportunity for training, as their first choice for barriers to

the advance of computer technology in their profession. Among educators, concern with budgetary shortages (88%) was perceived as the leading obstacle to uses of computer technology. The leading issue of concern for design professionals (63%) was lack of training opportunities, whereas students (59%) were primarily concerned with lack of hands-on computer experience. Each of these choices reflected differences in professional goals: training and hands-on experience for designers and students and the ability to provide adequate resources among educators.

Table 4-18. Perceptions of Obstacles to Use of Computer Technology in Arts and Design Among Educators, Students, and Professionals.

Item No.	Educators % (rank)	Students % (rank)	Professionals % (rank)
1. Lack of budget	88 (1)	43 (3)	60 (2)
2. Lack of confidence	15 (4)	24 (4)	11 (4)
3. Lack of computer hands-on experience	67 (2)	59 (1)	40 (3)
4. Lack of opportunity for training	60 (3)	52 (2)	63 (1)
5. Other	6 (5)	3 (5)	6 (5)

Note: The percentage totals were greater than 100 since subjects responded to more than one category.

Second choices of concern were varied among the three population groups. Educators (67%) were concerned with providing hands-on experience, students (62%) with training opportunities, and professionals (60%) with budgetary issues. All groups were in agreement upon those factors which constituted the least barriers to the uses of com-

puter technology in design fields: lack of confidence in computer use (rank 4) and other reasons (rank 5). Other reasons cited among students were lack of knowledge of English or access to computer graphics specialists; other reasons cited among educators included lack of access to personal computer specialists; and other reasons cited among professionals were lack of access to computer graphics consultants, lack of visual aids, and lack of basic computer knowledge.

Research Question Eight

8) Among graphic design educators, students, and professionals, what types of computer knowledge and skills are perceived as essential for the present and future development of graphic design fields?

Means and rank order were used to indicate the types of computer knowledge and skills that educators, students, and professionals perceived as essential for present and future development of the field of graphics design in Thailand. As shown in Table 4-19, from a comparison of means among educators, students, and design professionals, there was agreement on the two most important factors: (1) uses of computer artistic and creative software and (2) use of mouse and keyboard. Differences among the three groups that were of interest are that students and professionals

ranked the graphics tablet and light pen low, whereas educators found these tools to be the fourth most important consideration. This was also true for use of raster graphics techniques and 3D computer graphics, moderately valued by students and professionals, but less so by educators. Generally, there was agreement among all three groups on the value of skills/knowledge for operating systems/utilities, computer programming, database operations, and project management software. However, all of these categories were ranked relatively low by all groups.

Table 4-19. Means and Rank of Importance for Diverse Computer Skills Among Educators, Students, and Professionals.

Competency area	Educators Mean (rank)	Students Mean (rank)	Professionals Mean (rank)
1. Mouse & keyboard	4.27 (2)	4.38 (2)	4.19 (2)
2. Tablet/light pen	4.18 (4)	3.70 (11)	3.67 (11)
3. Operating system/utilities	3.85 (13)	3.70 (11)	3.71 (9)
4. Computer programming	3.37 (14)	3.59 (12)	2.99 (13)
5. Database operations	3.33 (15)	3.33 (15)	2.91 (14)
6. Computer peripherals	4.19 (3)	3.90 (6)	3.93 (3)
7. Artistic/creative software	4.45 (1)	4.40 (1)	4.57 (1)
8. Experience with different computer systems	3.87 (12)	4.06 (3)	3.73 (8)
9. Vector graphics	3.94 (11)	3.71 (10)	3.63 (12)
10. Raster graphics	3.96 (10)	3.89 (7)	3.77 (6)
11. 2D computer graphics	4.00 (9)	3.81 (9)	3.92 (4)
12. 3D computer graphics	4.06 (8)	4.02 (4)	3.89 (5)
13. 2D computer animation	4.07 (7)	3.87 (8)	3.75 (7)
14. 3D computer animation	4.15 (5)	3.98 (5)	3.89 (5)
15. Video graphics	4.12 (6)	4.06 (3)	3.69 (10)
16. Project management	3.24 (16)	3.40 (13)	2.99 (13)

Differences among the composite means for the three population groups were subject to further evaluation by

ANOVA. The results indicated, in general, that significant differences existed among the three groups ($p = .0002$). The Newman-Keuls procedure was then employed to determine which two groups were significantly different at the alpha level .05. The results indicated that significant differences existed between both educators and students in relation to graphics design professionals at the .05 level of significance, but that there was not a significant difference between educators and students.

CHAPTER 5

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

A summary of the present study, including consideration of the principal findings and discussion of their significance, as well as the implications and recommendations derived from the study, are presented in this chapter.

Summary

The purpose of this study was (1) to investigate the use of computer technology in the fields of graphic design in Thailand, and (2) to identify present and future patterns of computer usage among graphic design educators, students, and professionals. Descriptive data were used to identify methods to encourage the integration of computer technology into art and design programs at Chulalongkorn University, as well as to provide a foundation upon which future research on the use of computers for graphic design can be based.

The target population for this study consisted of three groups in Thailand: 1) full-time graphics design educators, as listed by the Ministry of Universities and Institute of Technology Affairs, and the Ministry of Educa-

tion; 2) art and design students enrolled in computer graphics courses at Chulalongkorn University; and 3) graphic design directors and employees in professional business positions, as listed in the Thailand Advertising Directory. There were a total of 280 respondents to the specifically designed survey instrument developed for this study.

The instrument developed was based upon a three-part questionnaire prepared by the researcher. Part I, consisting of 15 questions, was used to obtain specific personal and background information from each respondent. Part II of the instrument was designed to obtain respondents' opinions about support for the professional use of computers, the instructional use of computers in graphic arts and design curricula, and instruction in the ethics of computer use as a part of the content within graphic arts and design curricula. Part III of the instrument consisted of a 16-item questionnaire, responses to which were based upon a five-point Likert-type interval scale, directed at the determination of which computer skills and levels of knowledge respondents believed to be requirements for present and future career progress in the respondents' professional fields.

The survey instrument was prepared in cooperation with a panel of six experts selected by the Department of Creative Arts, Chulalongkorn University, each of whom was asked to verify content-related evidence to ensure the validity of the instrument. The result of Pearson product-moment

correlation coefficients for the pilot test was .975. The Hoyt and Stunkard (1952) test was completed for the 16 Likert-type scale items included on the final survey instrument. The overall reliability coefficient was .832. The data obtained from administration of the instrument were processed and analyzed using the *Statistical Package for Social Sciences* (SPSS/PC+) at Oregon State University. The statistical techniques employed for this study were administered as follows:

1) Since the investigation was concerned only with population means and percentages were required to address the research questions, frequency distributions, percentages, and cross-tabulation procedures were used as the appropriate statistical procedures.
2) A 3 × 2 contingency table chi-square test was used to determine whether there were significant differences in computer usage among graphic design educators, students, and professionals in Thailand.
3) A one-way ANOVA was used to compare differences between the means for the different subject groups considered for this study. When significant interactions between any two groups were determined to exist, the Newman-Keuls procedure was applied to the appropriate data.

A total of 553 survey questionnaires were either presented or mailed to the three target populations. The overall total complete response was 50.6 percent. The application of frequency statistics indicated that 12.1 percent were educators, 11.4 were university students, and 27.1 were professional designers. This rate of response, by subgroups, was as follows: 1) Of 140 questionnaires mailed to full-time graphics design educators, the rate of response was 48 percent; 2) of 63 questionnaires personally distributed by the researcher to third- and fourth-year students enrolled in computer graphics courses at Chulalongkorn University, the rate of response was 100 percent; and 3) of 350 questionnaires mailed to graphics design professionals, the rate of response was 42.8 percent.

Principal Findings

The rate and type of responses to the survey instrument indicated that to some degree the results may have been biased from within the three target populations. First, educators and students may not have had sufficient computer knowledge to fully complete the questionnaire, whereas professional designers might not have had sufficient time and/or computer knowledge to respond completely. Second, a substantial majority of the respondents in the survey groups were men (71.3%), the majority of whom were unmarried. This trend could be attributed to factors

related to the nature of their work, to working conditions, and to the personal responsibilities of the respondents.

Findings indicated that the majority of educators and professionals had average incomes between 10,000 to 20,000 *baht* per month, followed in number by those with average incomes from 5,000 to 10,000 *baht* per month. The majority of educators had more than 10 years of professional experience and had completed master of arts degrees in arts-related areas, whereas a majority of the privately employed designers stated that they had only from one to three years of professional experience and had baccalaureate degrees in various fields. At the same time, a majority (83.3%) of the professional population stated that they had completed preparation levels, at a range from "little" to "extensive" training, in the use of computers, while the majority of educators (68.7%) and students (69.8%) indicated that they had completed preparation levels in the use of computers only in training ranges from "none" to "little."

Design professionals had more extensive computer preparation, which may have served to offset their low educational levels in relation to professional educators with respect to the distribution of wages among these two population groups. This was seemingly true only with respect to income levels that would reflect entry level positions. That is, while the percentages of both groups earning average monthly incomes to 10,000 *baht* were approximately equivalent (with a greater percentage of designers at the lower

end of this range), a larger percentage of professional designers was placed in ranges of from 20,000 to 40,000 *baht* per month than were educators; this proportion was reversed when the highest income ranges were considered, from 40,000 *baht* per month upward. However, the percentages in each of these range groups (i.e., 20,000-40,000 or 40,000 or more *baht*) reflected only a small proportion of the total number of respondents (Table 4-7).

Substantial majorities of each population group (i.e., 70% of all educators, 56% of all students, and 73% of all design professionals) supported the use of computers in their professions or chosen professional fields, and were in agreement that computers would help them to improve work efficiency and save time within their studios, while at the same time provide the means to improve both characteristics of quality and efficiency in the completion of graphic arts tasks (25% of all educators, 21% of all students, and 34% of all design professionals). A majority, in a percentage range from 60 percent (educators) to 95 percent (students), of all three groups also stated that they presently used computers in their professions and/or coursework. However, significant differences were found in computer use frequencies among the three groups. Nearly all of the students indicated frequent and regular use of computers, whereas this was true of only 60 percent of the educators and 79 percent of the professional designers.

Among educators and professionals, 37.5 and 23.7 percent, respectively, used computers between 1 to 5 hours per week, whereas 50 percent of the students used computers from 5 to 10 hours per week. This difference may suggest that students had more knowledge about the basic uses of computes than the other two groups, and/or that students were interested in exploring new possibilities for computer use in the studio. At the same time, 41 percent of the professionals stated that they used computers for 20 or more hours each week, compared to only 17.5 percent of the educators and none of the students. This difference may have reflected the production orientation of the employees of private graphic design firms.

There were slight differences in the rank order for use areas among educators, students, and professionals. However, publications and graphics design constituted the highest ranked computer use area for all groups within the target population. The majority of students and professional designers used Macintosh computers in their work, whereas the majority of educators used an IBM or compatible system. These finding may be a reflection of the perceived suitability of Macintosh computers to graphic design and artistic applications. For example, the Department of Creative Arts at Chulalongkorn University uses only the Macintosh computer.

Educators, students, and professional designers reflected only slight differences in the extent of their

support for the use of computers within arts and design curricula as well as the integration of standards of ethics for the use of computer technology within the same curricular content. There was general agreement that the computer should be integrated into all levels of education wherever possible, but that the greatest emphasis, specific to arts and design curricula, should be placed at the level of the bachelors degree.

Each of the three population groups ranked improved efficiency within the studio as the principal advantage they perceived for computer use (i.e., supported by from 81% to 92% of students, educators, and design professionals, in ascending order of support), followed by improvements in quality and efficiency for the completion of graphic design tasks (percentage ranges from 75% to 84%, presented in the same order). Students and professional designers also shared the opinion that the use of computers would help them to reduce the costs of completing graphic tasks, whereas the two groups differed with respect to their concern for the use of computers to increase classroom efficiency. Unsurprisingly, students were more concerned than designers with this effect.

Educators felt that budgetary concerns with the principal barrier that could serve to inhibit the installation and maintenance of computers in graphic design fields, unlike students who perceived lack of computer availability for hands-on experience as the principal barrier. Accord-

ingly, designers employed in private firms stated that lack of opportunity to attend training courses was the major barrier they perceived to the utilization of computers in graphic design fields. Each of these positions would seem to be a clear preoccupation of the occupational status of each group.

A large majority (87.9%) of all respondents perceived the need within their fields for training in the uses of computers for specific artistic and creative tasks, followed by training in basic courses in computer operation. In addition, smaller proportions of the respondents supported the need for training in the use of computer languages (31.1%) or in the use of administrative software packages (15.4%). However, there were slight differences among educators, students, and professional designers with respect to training in desired types of knowledge and/or skills. All three groups were in agreement that the use of computer artistic and creative software and the mouse and keyboard should be the principal skill-learning priorities. However, there were significant differences between educators and students, on one hand, and design professionals for a range of other concerns for the development of knowledge areas and skills levels.

Discussion of the Findings

In Thailand, it has been generally recognized that computer technology will be an important contributor to national development, and various attempts have been made to encourage professional groups to make use of this technology. Thus, the emergence of computer technology has made a significant impact in the fields of art and design in Thailand, as evidenced by the findings of the present study. However, the use of computers in these fields is so relatively new that only a few research projects investigating the effects of this transformation have been completed and published.

Even in the United States, a highly developed and information-based nation, few research studies have been completed which have assessed the impact of computer technology upon art and design professionals. Rather, researchers or observers, as well as design professionals, have developed their own insights into the uses of computers in the fields of art and design. One of the purposes of this study was thus to examine whether, in Thailand, art educators have different views and objectives for the use of computer than artists or designers who use this technology. Educators, for example, may focus on the integration and development of computer art in school curricula, whereas artists may develop and refine the use of computers as a medium of individual artistic expression and design

professionals may focus on the end-product or economic point of view of productivity. However, one thing is certain; these insights and opinions may be related to occupationally specific concerns, but collectively they provide the main force which has spurred to advance of computer technology in the fields of art and design.

From this study, it was found that diverse opinions existed with respect to the use of computers in the fields of the arts and design. However, viewed globally, the data indicated that a majority of graphics design educators and professionals in Thailand have embarked upon efforts to introduce computer technology into their professions despite different objectives and purposes of use, different conceptions of the advantages of computers or of the barriers which presently prohibit the effective use of this technology, or because of differences in their occupational concerns. The findings of the present comparative study suggest that there are strong interrelationships between the three populations with respect to the uses of computers and support for the professional use of computers.

Ultimately, the findings suggest that educators, students, and professional designers perceive their concerns differently because their problems, needs, and professional preoccupations differ from one another. Members of each group responded to the survey in terms of what they regarded as personally and professionally essential and important to their group. Educators tended to focus on their

knowledge and experience in using the computer to organize instruction and classroom management, whereas graphic design professionals were seemingly more interested in the economic productivity capability of the computer. From a middle perspective, students were interested in learning and exploring new possibilities opened by computer technology as they engaged in studio production, or explored the way artists and designers have used computers to create art.

In the review of literature, at least one observation that the computer had no relevance to the fine arts was presented (Lewell 1985). From the results of the present study, this position was not evident. Students as well as professional designers stated that they used computers to create drawings or paintings. Educators, students, and professionals were in agreement in attributing a high priority to the use of computer artistic and creative software to develop needed skills and knowledge areas.

The overall findings of the present study suggest that although computers have been already introduced into the fields of art and design, there will also be a significant expansion of the use of computers in the fields of graphic design in the future and there remain additional areas that will require further development and improvement. It is evident that the implementation of improved computer training is still needed in this field, but also that these

training programs must reflect the needs of all potential participants.

Implications of the Study

In the United States, new sets of skills have been developed to maintain pace with advances in computer technologies. In art, such interdisciplinary skills as the use of computers for art and design and communication skills, as well as creative manpower administration, should be taught to individuals to meet the demands of emerging computer technology (*Computer Graphics Career Handbook*, 1989). Therefore, in Thailand, new sets of skills need to be developed to maintain pace with advances in computer technologies. The rapid growth of computers in the fields of art and graphic design in Thailand will be dependent upon the availability of technically trained creative manpower. It will be the responsibility of the indigenous educational system to provide such manpower.

The results of the present study suggest that graphics design educators, students, and professionals support the use of computers in their professions. However, their perceptions of the uses of computers in their fields continue to reflect preoccupations specific to their current placement within the fields of art and graphics design. Therefore, the results of this study should be viewed with careful consideration and made available for immediate use

as a support and rationale for the integration of computers in graphics design education, as well as for the professional development of privately employed graphics designers and artists in Thailand.

The results of the present study will help to increase awareness of the views of professionals currently employed in graphic design fields, thus facilitating the training of future design professionals in the uses of computers in the fields of art and design in Thailand. Therefore, the descriptive data gathered can be used to formulate guidelines and recommendations for the future development of computers in graphics design in Thailand. This survey has been only an initial step toward a systematic approach, reflecting the Leyton-Soto and Tyler (1969; Kaufman, 1973, 1975; Tyler, 1977) theory that the identification of all possible educational activities is the initial step in establishing goals and objectives for decision-making in curriculum development. This study therefore constitutes a foundation for systematic future research, encouraging the enhancement of understanding of the process required to integrate computer technology into art and design programs in Thailand.

Recommendations

Recommendations for Policy and Practice

1. In view of the long-term benefits of the use of computer technologyin Thailand, higher education should develop written policies and plans associated with the instruction and administration of the uses of computers and computer software in the fields of art and graphic design. Appropriate plans and policies should provide a framework for decision-making which is relevant to the needs of learners and educators as well as members of associated professional communities.

2. Information gained from the conduct of the present study should be used to prevent the misconceptions that may occur during the introduction of computer technology, as well as to provide a basis for plans and feedback that can be used to formulate guidelines for professional and educational staff development.

3. Findings from the present study provide support for continued growth in the use of computers and computer technology in the fields of art and graphic design in Thailand. It is thus recommended that institutions of higher education collect sufficient information to assess existing programs and/or create new programs to accommodate the growth in computer use in these fields. Additional research, as well as long-term projects and funding, will be

required to develop plans for the evaluation of hardware and software computer applications and integration into the fields of art and graphic design education.

4. Findings from the present study suggest that computers should be made available at all levels within educational institutions in Thailand. However, greater attention should be given to the undergraduate level. Educators, students, and professionals should be encouraged to gain additional computer experience. In particular, the expansion of hands-on experience should be considered. Methods should be developed to assist educators, students, and professionals in learning and relearning processes, as well as how these processes can be made enjoyable and attractive. Members of all three groups should be encouraged to think, to adapt, and to improvise in broadly scientific, creative, and intuitive manners, rather than to merely familiarize themselves with given technical fields.

5. Funds should be set aside for continuing experimentation and research based upon computer applications and other media appropriate to arts and graphic design programs.

Recommendations for Future Research

The following recommendations are based upon the insights and experiences gained through all the events that accompany a study of this nature:

1. Systematic studies of the creative and intuitive uses of computers should be developed to measure the effects of computer utilization in educational fields in Thailand.
2. Research studies should be conducted among other art and graphic design populations and communities at-large in Thailand. The results from these studies should provide useful comparative data for decision-making with respect to future programs of art and graphic design education in Thailand.
3. Technology in education is subject to rapid processes of change. To derive maximum benefits from technology, research should be conducted periodically to delineate which changes, if any, should be recommended as institutions of higher education in Thailand reassess their curricula for future development.
4. The results of the present study demonstrate that concern for the protection of ethical standards for the uses of computers will be an important issue in the field of art and graphics design. It is imperative that students should be instructed in the ethical, legal, moral, and social aspects of computer use. Additional research will be required to develop understanding of social issues and the effects of progress in computer technology.

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APPENDICES

Appendix A

Preliminary Survey Questionnaire

INSTRUMENT

Part I: Personal Information

Please mark (x) the most appropriate answer. Check only those that apply to you.

1. Sex:

   a. Female b. Male

2. Occupational status:

   a. Educator b. Graphic Designer c. Student

3. Years of total experience in your profession:

   a. 0-1 year
   b. 1-3 years
   c. 3-5 years
   d. 5-10 years
   e. more than 10 years

4. Highest degree(s) earned & major field:

   a. Ph.D. (Ed.D.) in .....
   b. Master's Degree in .....
   c. Bachelor's Degree in .....
   d. Associate's Degree in .....
   e. Other (Specify) .....

5. Do you use computers in your work?

   a. Yes b. No

6. How often do you use computers in your work each day?

   a. Less than 1 hour
   b. Between 1-5 hours
   c. Between 5-10 hours
   d. I currently do not use computers in my work, nor I will use them in the future (go to question No. 9)
   e. I currently do not use computers in my work, but I am planning to use in them the future (go to question No. 9)

7. In what ways have you applied computers to your work?

   a. Art (drawing, painting)
   b. Publication graphics
   c. Image processing (video)
   d. Word processing
   e. Computer assisted animation
   f. Simulation
   g. Multimedia
   h. Spreadsheet/database
   i. Other (specify).....

8. How did you acquire the computer training necessary in your job?

   a. Self taught (i.e., books and visual aids)
   b. Formal courses in college or a learning institution
   c. On the job training
   d. Intensive workshop training
   e. Other (specify).....

9. What obstacles may inhibit you from using computers?

   a. Lack of budget to install computers and maintain them
   b. Lack of confidence in the use of computers
   c. Lack of computer availability for hands-on experience
   d. Lack of chances in attending training
   e. Other (Specify).....

10. What training and/or retraining is needed for computer utilization in your present job or jobs you may hold in the future?

   a. Training to use computers with ready access to computers
   b. Training for specific tasks (i.e., page layout, illustration, image processing, etc.)
   c. Training in the use of computer languages
   d. Training in the use of administrative software packages
   e. Other (specify).....

11. What advantages are likely to result from the utilization of computers in your job?

   a. Improved efficiency in the studio and/or classroom environment
   b. Improved quality and efficiency in completion of graphic design tasks
   c. Maintain personal records and inventory of supplies
   d. To better prepare myself for future career opportunities
   e. Other (specify).....

12. Do you support the use of the computers for artistic application?

   a. Yes b. No

   Please indicate reason why?
   .....
   .....
   .....

13. Do you feel that the computers should be integrated into art and design curricula?

   a. Yes b. No

   Please indicate reasons why?

   .....

   .....

   .....

If Yes, what level do you feel that the computer should be integrated into art and design curricula?

a. Elementary school level
b. Secondary school level
c. Bachelor degree level
d. Master degree level
e. Other (specify) .....

14. Do you support instruction in the ethics of computer use as a part of the content within art and design curricula?

a. Yes b. No

PART II

1. What present and future skills and/or knowledge do you believe may be needed for computer utilization?

Please indicate the extent to which you agree or disagree with the need for the following specific skills and knowledge necessary to do your job, based upon the following scale. Please circle the most appropriate response for each of the questions below.

1 = Not Important
2 = Important
3 = Not Sure
4 = Very Importanct
5 = Extremely Important

1.	Use of mouse and keyboard	1	2	3	4	5
2.	Use of graphics tablet and light pen	1	2	3	4	5
3.	Knowledge of operating system (i.e., DOS, MSDOS, UNIX, Macintosh)	1	2	3	4	5
4.	Use of computer programming (i.e., BASIC, C, FORTRAN, PASCAL)	1	2	3	4	5
5.	Use of database operations	1	2	3	4	5
6.	Use of computer peripherals hardware (i.e., scanners, video, slidemaker)	1	2	3	4	5
7.	Use of computer artistic and creative software (i.e., pagelayout, Illustration, or image manipulation)	1	2	3	4	5
8.	Hands-on experience on one computer system	1	2	3	4	5
9.	Hands-on experience on more than one computer system	1	2	3	4	5
10.	Use of vector graphics technique	1	2	3	4	5
11.	Use of video graphics technique	1	2	3	4	5
12.	Use of 2D and 3D computer graphics	1	2	3	4	5
13.	Use of 2D and 3D computer animation techniques	1	2	3	4	5
14.	Use of ray tracing techniques	1	2	3	4	5
15.	Skill in using computers as a tool in studio and classroom management	1	2	3	4	5

* Please list other skills and areas of competence which may not have been suggested in the survey questions.

.....

.....

.....

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.....

.....

* Would you like to have the result of this study?

a. Yes
b. No

* Your Address:

_____
_____
_____
_____

No.....

แบบสอบถาม

ตอนที่ ๑: ประวัติและข้อมูลส่วนบุคคล

คำแนะนำ โปรดกาเครื่องหมาย X ทับหัวข้อของข้อความแต่ละข้อในข้อมูลที่เกี่ยวกับท่านตามความเป็นจริง

๑. เพศ

๑. หญิง ๒. ชาย

๒. อาชีพ

๑. อาจารย์และ/หรือนักวิชาการ

๒. นักออกแบบกราฟฟิก

๓. นิสิต/นักศึกษา

๓. ประสบการณ์ในการทำงานของท่าน

๑. ๐-๑ ปี

๒. ตั้งแต่ ๑ ถึง ๓ ปี

๓. ตั้งแต่ ๓ ถึง ๕ ปี

๔. ตั้งแต่ ๕ ถึง ๑๐ ปี

๕. มากกว่า ๑๐ ปีขึ้นไป

๔. การศึกษาสูงสุดและสาขาวิชาที่ศึกษา

๑. ปริญญาเอก สาขา.....

๒. ปริญญาโท สาขา.....

๓. ปริญญาตรี สาขา.....

๔. อนุปริญญาหรือเทียบเท่า สาขา.....

๕. อื่น ๆ .....

๕. ท่านใช้คอมพิวเตอร์ในการทำงานหรือไม่

๑. ใช้ ๒. ไม่ใช้

๖. จำนวนชั่วโมงที่ท่านใช้คอมพิวเตอร์ในการทำงานของท่านในแต่ละวัน

๑. น้อยกว่า ๑ ชั่วโมง

๒. ระหว่าง ๑ ถึง ๕ ชั่วโมง

๓. ระหว่าง ๕ ถึง ๑๐ ชั่วโมง

๔. ขณะนี้ข้าพเจ้าไม่ได้ใช้คอมพิวเตอร์ในการทำงานและคิดว่า จะไม่ใช้ในอนาคตด้วย (ทำต่อข้อ ๘)

๕. ขณะนี้ข้าพเจ้าไม่ได้ใช้คอมพิวเตอร์ในการทำงานแต่ข้าพเจ้ามีโครงการที่จะใช้ในอนาคต (ทำต่อข้อ ๘)

๗. ท่านใช้คอมพิวเตอร์ในงานประเภทใด (ตอบได้มากกว่า ๑ ข้อ)

๑. จิตรกรรมและวาดเส้น (Painting, Drawing)

๒. ออกแบบกราฟฟิกและการพิมพ์

๓. ภาพถ่ายและ/หรือ วีดีโอ (Image processing)

๔. Word processing

๕. การสร้างภาพเคลื่อนไหว

๖. Simulation

๗. Multimedia

๘. ระบบฐานข้อมูล (Spreadsheet and Database)

๙. อื่น ๆ (โปรดระบุ).....

๘. ท่านเรียนรู้การใช้คอมพิวเตอร์เพื่อใช้ในการทำงานของท่านได้อย่างไร

๑. ด้วยตนเอง

๒. จากสถาบันการศึกษา

๓. จากการปฏิบัติงาน

๔. จากการอบรมและ/สัมมนาในหลักสูตรเร่งรัดพิเศษ

๕. อื่น ๆ (โปรดระบุ).....

๙. สาเหตุที่ท่านคิดว่าเป็นปัญหาในการนำคอมพิวเตอร์มาใช้ในงานของท่าน

๑. ขาดแคลนงบประมาณในการจัดซื้อและบำรุงรักษา

๒. ขาดความมั่นใจในการใช้คอมพิวเตอร์

๓. ขาดแคลนคอมพิวเตอร์สำหรับใช้งาน

๔. ขาดโอกาสในการเข้าฝึกอบรมและสร้างเสริมประสบการณ์

๕. อื่น ๆ (โปรดระบุ).....

๑๐. ท่านต้องการเพิ่มพูนความรู้เกี่ยวกับการใช้คอมพิวเตอร์สำหรับใช้งานในปัจจุบันหรืองานในอนาคตของท่านอย่างไร

๑. ฝึกอบรมวิธีการใช้เครื่องคอมพิวเตอร์ได้อย่างถูกต้อง

๒. ฝึกอบรมสำหรับงานด้านการออกแบบโดยเฉพาะ

(เช่น pagelayout, illustrator, image processing)

๓. การฝึกอบรมการเขียนโปรแกรมโดยใช้ภาษาคอมพิวเตอร์

๔. การฝึกอบรมการใช้โปรแกรมสำเร็จรูปทางงานบริหารและธุรกิจ

๕. อื่น ๆ (โปรดระบุ).....

๑๑. ประโยชน์ที่ท่านได้รับหรือคาดว่าจะได้จากการใช้คอมพิวเตอร์ในงานของท่าน

๑. เพิ่มประสิทธิภาพของการทำงานในสตูดิโอและ/หรือในชั้นเรียน

๒. เพิ่มคุณภาพในผลงานออกแบบกราฟฟิก

๓. ใช้เก็บข้อมูลของบุคลากรและพัสดุ

๔. เพื่อเตรียมตัวสำหรับการจ้างงานในอนาคต

๕. อื่นๆ (โปรดระบุ).....

๑๒. ท่านเห็นด้วยหรือไม่ในการนำคอมพิวเตอร์มาใช้สำหรับการออกแบบและสร้างสรรค์งานทางศิลปะ

๑. เห็นด้วย ๒. ไม่เห็นด้วย

โปรดระบุเหตุผล .....

.....

.....

๑๓. ท่านเห็นด้วยหรือไม่ว่าความรู้ทางคอมพิวเตอร์ควรถูกบรรจุลงในหลักสูตรศิลปะและการออกแบบ

๑. เห็นด้วย ๒. ไม่เห็นด้วย

โปรดระบุเหตุผล .....

ถ้าท่านเห็นด้วย ท่านคิดว่าความรู้ทางคอมพิวเตอร์ควรถูกบรรจุลงในหลักสูตรศิลปะและการออกแบบในระดับการศึกษาใด

๑. ประถมศึกษา

๒. มัธยมศึกษา

๓. ปริญญาตรี

๔. ปริญญาโท

๕. อื่น ๆ (โปรดระบุ).....

๑๔. ท่านเห็นด้วยหรือไม่ว่าควรจะมีการสอนจรรยาบรรณของการใช้คอมพิวเตอร์ในหลักสูตรศิลปะและการออกแบบ

๑. เห็นด้วย ๒. ไม่เห็นด้วย

ตอนที่ ๒: ความรู้และทักษะที่ท่านคิดว่าเป็นสิ่งจำเป็นในการนำคอมพิวเตอร์มาใช้ในการทำงานของท่าน

<u>คำแนะนำ</u> โปรดทำเครื่องหมาย X ทับตัวเลข ซึ่งแสดงถึงระดับความเห็นของท่านในเรื่องความรู้และทักษะในการใช้คอมพิวเตอร์ที่ท่านคิดว่าจะเห็นสิ่งสำคัญในการทำงานของท่าน

๑. หมายถึง ไม่สำคัญอย่างที่สุด

๒. หมายถึง ไม่สำคัญ

๓. หมายถึง ไม่ตัดสินใจ

๔. หมายถึง สำคัญมาก

๕. หมายถึง สำคัญมากที่สุด

๑. การใช้ Mouse และ Keyboard	๑ ๒ ๓ ๔ ๕
๒. การใช้ Graphic tablet และ Light pen	๑ ๒ ๓ ๔ ๕
๓. ความรู้ในเรื่อง Operating system, (เช่น DOS, MSDOS, UNIX, MACINTOSH)	๑ ๒ ๓ ๔ ๕
๔. การใช้ภาษาคอมพิวเตอร์ (เช่น BASIC, C, PASCAL, FORTRAN)	๑ ๒ ๓ ๔ ๕
๕. การใช้ระบบฐานข้อมูล (Database)	๑ ๒ ๓ ๔ ๕
๖. การใช้คอมพิวเตอร์ Hardware อื่น ๆ (เช่น Scanners, Video, Slide maker)	๑ ๒ ๓ ๔ ๕
๗. การใช้โปรแกรมสำเร็จรูปที่ใช้สร้างงานศิลปะและงานออกแบบ (เช่น Pagemaker, Freehand, Illustrator, Image manipulation)	๑ ๒ ๓ ๔ ๕
๘. ใช้คอมพิวเตอร์ได้หนึ่งระบบ	๑ ๒ ๓ ๔ ๕
๙. ใช้คอมพิวเตอร์ได้มากกว่าหนึ่งระบบ	๑ ๒ ๓ ๔ ๕
๑๐. ใช้เทคนิค Vector graphics	๑ ๒ ๓ ๔ ๕
๑๑. ใช้เทคนิค วีดีโอกราฟฟิก	๑ ๒ ๓ ๔ ๕
๑๒. การใช้เทคนิค 2D และ 3D Computer Graphics	๑ ๒ ๓ ๔ ๕
๑๓. การใช้เทคนิค 2D และ 3D Computer Animation	๑ ๒ ๓ ๔ ๕
๑๔. การใช้เทคนิค Ray tracing	๑ ๒ ๓ ๔ ๕
๑๕. ทักษะการใช้โปรแกรมทางบริหารงานในสตูดิโอและการบริหารชั้นเรียน	๑ ๒ ๓ ๔ ๕

หากท่านมีความประสงค์จะได้บทคัดย่อของการวิจัยในครั้งนี้ โปรดกรุณาเขียนชื่อ และสถานที่เพื่อการจัดส่งในภายหลัง

ชื่อ.....

สถานที่.....

.....

Appendix B

Expert Panel Members

Araya Srikanlayanabuth
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236-0295, 238-3070

Pichakorn Pimonsathian
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Jaroenkrung 63, Yannawa
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Supachai Chanyasawad
Managing Director
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392/18 Siam Square Soi 5 (3rd Floor)
Rama I Road, Bangkok 10330, Thailand
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Appendix C

Survey Instrument

No.

INSTRUMENT

An Assessment of Computer Utilization by Graphic Design Professionals in Thailand

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PART I: Personal Information

Please mark (x) or circle the appropriate answer. Check only one answer that applies to you.

1. Sex:

   a. Female b. Male

2. Family status:

   a. Single b. Married
   c. Divorced d. Other (Specify).....

3. Occupational status:

   a. Educator
   b. Graphic Designer
   c. Student (go to question No. 7)

4. Years of total experience in your profession:

   a. less than 1 year
   b. 1-3 years
   c. 3-5 years
   d. 5-10 years
   e. more than 10 years

5. Highest degree(s) earned & major field (students go to question No. 7):

   a. Ph.D. (Ed.D.) in .....
   b. Master's Degree in .....
   c. Bachelor's Degree in .....
   d. Associate's Degree in .....
   e. Other (Specify) .....

6. Salary range for your profession (Baht/month):

   a. between 5,000 to 10,000
   b. between 10,000 to 20,000
   c. between 20,000 to 30,000
   d. between 30,000 to 40,000
   e. between 40,000 to 50,000
   f. more than 50,000

7. What level of preparation do you have in the use of computers?

   a. None
   b. little
   c. Moderate
   d. extensive

8. Do you use computers in your work?

   a. Yes (go to question No. 9) b. No

   8.1 If answer No, do you have plans to use them in the future?

      a. Yes (go to question No. 13)
      b. No (go to question No. 13)

9. How did you acquire the computer training necessary in your job?

   a. Self taught (i.e. books and visual aids)
   b. Formal courses in college or a learning institution
   c. On the job training.
   d. Intensive workshop training
   e. Other (Specify) .....

10. How often do you use computers in your work per week?

   a. Between 1-5 hours
   b. Between 5-10 hours
   c. Between 10-20 hours
   d. Between 20-30 hours
   e. Between 30-40 hours
   f. between 40-50 hours
   g. more than 50 hours

11. What kind of computers are you using in your work?

   a. IBM or Compatible
   b. Macintosh
   c. Other (Specify).....

12. In what ways have you applied computers in your work?

a. Art (Drawing, Painting)
b. Publications and graphic
c. Image processing (Video)
d. Word processing
e. Computer assisted animation
f. Simulation
g. Multimedia
h. Spreadsheet/ database
i. Other (Specify).....

13. What are major obstacles which may inhibit you from using computers?

a. Lack of budget to install computer and maintain them
b. Lack of confidence in using computers
c. Lack of computer availability for hands-on experience
d. Lack of chances in attending training
e. Other (Specify).....

14. What training and/or retraining is needed for computer utilization in your present job or jobs you may hold in the future?

a. Training a basic course in computer operation
b. Training for specific tasks (i.e. page layout, illustrator, immage processing, etc.)
c. Training in the use of computer languages
d. Training in the use of administrative software packages
e. Other (specify).....

15. What advantages are likely to result from the utilization of computers in your job?

a. Improved efficiency in the studio environment
b. Improved efficiency in the classroom environment
b. Improve quality and efficiency in completion of graphic design tasks
c. Maintain personal records and inventory of supplies
d. To better prepare myself for future career opportunities
e. Other (specify).....

PART II:

1. Do you support the use of the computer in your profession?

   a. Yes b. No

   Please indicate reasons why?.....
   .....

2. Do you feel that computers should be integrated into art and design curricula?

   a. Yes b. No

   Please indicate reasons why?.....
   .....

   2.1 If YES, what level do you feel that the computers should be integrated into art and design curricula?

   a. Elementary school level
   b. Secondary school level
   c. Bachelor degree level
   d. Master degree level
   e. Other (specify).....

3. Do you support instruction in the ethics of computer use as part of the content within art and design curricula? (E.g. the issues of computer software copying, computer abuse, and plagiarism.)

   a. Yes b. No

PART III:

What future skills and/or knowledge do you believe may be needed for computer utilization ?

Please indicate the extent to which you agree or disagree with the need for the following specific skills and knowledge necessary to do your job based upon the following scale. Please mark (x) or circle your responses for each question below.

1 = not important

2 = important

3 = moderately important

4 = very important

5 = extremely important

SAMPLE

1. Use of computer software	1	2	3	4	5
1. Use of mouse and keyboard	1	2	3	4	5
2. Use of graphic tablet and light pen	1	2	3	4	5
3. Knowledge of operating system and Utility (i.e. DOS, MS DOS, UNIX, MACINTOSH)	1	2	3	4	5
4. Use of computer programming (i.e. BASIC, C, FORTRAN, PASCAL)	1	2	3	4	5
5. Use of data base operations	1	2	3	4	5
6. Use of computer peripherals hardware (i.e. Scanners, Video, Slide Maker)	1	2	3	4	5
7. Use of computer artistic and creative software (i.e. pagelayout, illustrator, image manipulation)	1	2	3	4	5
8. Hands on experience on more than one computer systems	1	2	3	4	5
9. Use of vector graphics technique (i.e. CAD/CAM and Drawing program)	1	2	3	4	5
10. Use of Raster graphics technique (i.e. Painting program)	1	2	3	4	5

Please indicate the extent to which you agree or disagree with the need for the following specific skills and knowledge necessary to do your job based upon the following scale. Please mark (X) for your responses for each question below.

1 = not important

2 = important

3 = moderately important

4 = very important

5 = extremely important

11.	Use of 2D computer graphics	1	2	3	4	5
12.	Use of 3D computer graphics	1	2	3	4	5
13.	Use of 2D computer animation technique	1	2	3	4	5
14.	Use of 3D computer animation technique	1	2	3	4	5
15.	Use of Video Graphics techniques	1	2	3	4	5
16.	Use of project management software	1	2	3	4	5

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* Please list other skills and area of competence which may not have been suggested in the survey questions.

.....

.....

.....

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.....

* Would you like to have the results of this study?

a. Yes
b. No

Your Address:

No.....

แบบสอบถาม

การประเมินการใช้คอมพิวเตอร์โดยกลุ่มอาชีพกราฟฟิกดีไซน์ในประเทศไทย

<u>ตอนที่ ๑: ประวัติและข้อมูลส่วนบุคคล</u>

<u>คำแนะนำ</u> โปรดกาเครื่องหมาย X ทับหัวข้อของข้อความแต่ละข้อในข้อมูลที่เกี่ยวกับท่านตามความเป็นจริง

๑. เพศ

๑. หญิง ๒. ชาย

๒. สถานภาพทางครอบครัว

๑. โสด

๒. สมรส

๓. หย่า

๔. อื่น ๆ .....

๓. อาชีพ

๑. อาจารย์และ/หรือนักวิชาการ

๒. นักออกแบบกราฟฟิก

๓. นิสิต/นักศึกษา (ข้ามไปตอบข้อ ๗)

๔. ประสบการณ์ในการทำงานของท่าน (ถ้าเป็นนิสิต นักศึกษา ไม่ต้องตอบ)

๑. น้อยกว่า ๑ ปี

๒. ตั้งแต่ ๑ ถึง ๓ ปี

๓. ตั้งแต่ ๓ ถึง ๕ ปี

๔. ตั้งแต่ ๕ ถึง ๑๐ ปี

๕. มากกว่า ๑๐ ปีขึ้นไป

๕. การศึกษาสูงสุดและสาขาวิชาที่ศึกษา (ถ้าเป็นนิสิต นักศึกษา ไม่ต้องตอบ)

๑. ปริญญาเอก สาขา.....

๒. ปริญญาโท สาขา.....

๓. ปริญญาตรี สาขา.....

๔. อนุปริญญาหรือเทียบเท่า สาขา.....

๕. อื่น ๆ .....

๖. รายได้เฉลี่ยต่อเดือน (ถ้าเป็นนิสิต นักศึกษา ไม่ต้องตอบ)

๑. ระหว่าง ๕,๐๐๐-๑๐,๐๐๐ บาท

๒. ระหว่าง ๑๐,๐๐๐-๒๐,๐๐๐ บาท

๓. ระหว่าง ๒๐,๐๐๐-๓๐,๐๐๐ บาท

๔. ระหว่าง ๓๐,๐๐๐-๔๐,๐๐๐ บาท

๕. ระหว่าง ๔๐,๐๐๐-๕๐,๐๐๐ บาท

๖. มากกว่า ๕๐,๐๐๐ บาท ขึ้นไป

๗. ระดับความรู้และความสามารถในการใช้คอมพิวเตอร์ของท่าน

๑. ไม่มีเลย

๒. นิดหน่อย

๓. ปานกลาง

๔. มาก

๘. ท่านใช้คอมพิวเตอร์ในการทำงานหรือไม่

๑. ใช้ (ทำต่อข้อ ๙) ๒. ไม่ใช้

๘.๑ ถ้าท่านไม่ใช้ ท่านมีโครงการที่จะใช้ในอนาคตหรือไม่

๑. มี (ทำต่อข้อ ๑๓) ๒. ไม่มี (ทำต่อข้อ ๑๓)

๙. ท่านเรียนรู้การใช้คอมพิวเตอร์เพื่อใช้ในการทำงานของท่านได้อย่างไร

๑. ด้วยตนเอง

๒. จากสถาบันการศึกษา

๓. จากการปฏิบัติงาน

๔. จากการอบรมและ/สัมมนาในหลักสูตรเร่งรัดพิเศษ

๕. อื่น ๆ (โปรดระบุ).....

๑๐. จำนวนชั่วโมงที่ท่านใช้คอมพิวเตอร์ในการทำงานของท่านใน ๑ สัปดาห์

๑. ระหว่าง ๑ ถึง ๕ ชั่วโมง

๒. ระหว่าง ๕ ถึง ๑๐ ชั่วโมง

๓. ระหว่าง ๑๐ ถึง ๒๐ ชั่วโมง

๔. ระหว่าง ๒๐ ถึง ๓๐ ชั่วโมง

๕. ระหว่าง ๓๐ ถึง ๔๐ ชั่วโมง

๖. ระหว่าง ๔๐ ถึง ๕๐ ชั่วโมง

๗. มากกว่า ๕๐ ชั่วโมง

๑๑. ชนิดของคอมพิวเตอร์ที่ท่านใช้

๑. PC (IBM หรือ PC Compatible)

๒. MACINTOSH

๓. Work station อื่น ๆ (โปรดระบุ).....

๑๒. ท่านใช้คอมพิวเตอร์ในงานประเภทใด

๑. จิตรกรรมและวาดเส้น (Painting, Drawing)

๒. ออกแบบกราฟฟิกและการพิมพ์

๓. ภาพถ่ายและ/หรือ วีดีโอ (Image processing)

๔. Word processing

๕. การสร้างภาพเคลื่อนไหว

๖. Simulation

๗. Multimedia

๘. ระบบฐานข้อมูล (Spreadsheet and Database)

๙. อื่น ๆ (โปรดระบุ).....

๑๓. สาเหตุที่ท่านคิดว่าเป็นปัญหาในการนำคอมพิวเตอร์มาใช้ในงานของท่าน

๑. ขาดแคลนงบประมาณในการจัดซื้อและบำรุงรักษา

๒. ขาดความมั่นใจในการใช้คอมพิวเตอร์

๓. ขาดแคลนคอมพิวเตอร์สำหรับใช้งาน

๔. ขาดโอกาสในการเข้าฝึกอบรมและสร้างเสริมประสบการณ์

๕. อื่น ๆ (โปรดระบุ).....

๑๔. ท่านต้องการเพิ่มพูนความรู้เกี่ยวกับการใช้คอมพิวเตอร์สำหรับใช้งานในปัจจุบันหรืองานในอนาคตของท่านอย่างไร

๑. ฝึกอบรมวิธีการใช้เครื่องคอมพิวเตอร์ได้อย่างถูกต้อง

๒. ฝึกอบรมสำหรับงานด้านการออกแบบโดยเฉพาะ

(เช่น pagelayout, illustrator, image processing)

๓. การฝึกอบรมการเขียนโปรแกรมโดยใช้ภาษาคอมพิวเตอร์

๔. การฝึกอบรมการใช้โปรแกรมสำเร็จรูปทางงานบริหารและธุรกิจ

๕. อื่น ๆ (โปรดระบุ).....

๑๕. ประโยชน์ที่ท่านได้รับหรือคาดว่าจะได้จากการใช้คอมพิวเตอร์ในงานของท่าน

๑. เพิ่มประสิทธิภาพของการทำงานในสตูดิโอ

๒. เพิ่มประสิทธิภาพของการทำงานในชั้นเรียน

๓. เพิ่มคุณภาพในผลงานออกแบบกราฟฟิก

๔. ใช้เก็บข้อมูลของบุคลากรและพัสดุ

๕. เพื่อเตรียมตัวสำหรับการจ้างงานในอนาคต

๖. อื่นๆ (โปรดระบุ).....

.....

ตอนที่ ๒: ความคิดเห็น

๑. ท่านเห็นด้วยหรือไม่ในการนำคอมพิวเตอร์มาใช้เป็นเครื่องมือในการทำงานของท่าน

๑. เห็นด้วย ๒. ไม่เห็นด้วย

โปรดระบุเหตุผล .....

.....

.....

๒. ท่านเห็นด้วยหรือไม่ว่าความรู้ทางคอมพิวเตอร์ควรถูกบรรจุลงในหลักสูตรการออกแบบกราฟฟิก

๑. เห็นด้วย ๒. ไม่เห็นด้วย

โปรดระบุเหตุผล .....

.....

.....

๒.๑ ถ้าท่านเห็นด้วย ท่านคิดว่าความรู้ทางคอมพิวเตอร์ควรถูกบรรจุลงในหลักสูตรการออกแบบกราฟฟิกในระดับการศึกษาใด

๑. ประถมศึกษา

๒. มัธยมศึกษา

๓. ปริญญาตรี

๔. ปริญญาโท

๕. อื่น ๆ (โปรดระบุ).....

๓. ท่านเห็นด้วยหรือไม่ว่าควรจะมีการสอนจรรยาบรรณของการใช้คอมพิวเตอร์ในหลักสูตรการออกแบบกราฟฟิก (เช่น ในเรื่องการลอก Software การใช้เครื่องคอมพิวเตอร์ และการลอกเลียนผลงานผู้อื่น)

๑. เห็นด้วย ๒. ไม่เห็นด้วย

ตอนที่ ๒: ความรู้และทักษะที่ท่านคิดว่าเป็นสิ่งจำเป็นในการนำคอมพิวเตอร์มาใช้ในการทำงานของท่าน

คำแนะนำ โปรดทำเครื่องหมาย X ทับตัวเลข ซึ่งแสดงถึงระดับความเห็นของท่านในเรื่องความรู้และทักษะในการใช้คอมพิวเตอร์ที่ท่านคิดว่าจะเห็นสิ่งสำคัญในการทำงานของท่าน

๑. หมายถึง ไม่สำคัญอย่างที่สุด

๒. หมายถึง ไม่สำคัญ

๓. หมายถึง สำคัญปานกลาง

๔. หมายถึง สำคัญมาก

๕. หมายถึง สำคัญมากที่สุด

.....

ตัวอย่าง:

๑. การใช้ 3D Computer Graphics ๑ ๒ ๓ ๔ ๕

.....

๑. การใช้ Mouse และ Keyboard ๑ ๒ ๓ ๔ ๕

๒. การใช้ Graphic tablet และ Light pen ๑ ๒ ๓ ๔ ๕

๓. ความรู้ในเรื่อง Operating system, Utility (เช่น DOS, MSDOS, UNIX, MACINTOSH) ๑ ๒ ๓ ๔ ๕

๔. การใช้ภาษาคอมพิวเตอร์ (เช่น BASIC, C, PASCAL, FORTRAN) ๑ ๒ ๓ ๔ ๕

๕. การใช้ระบบฐานข้อมูล (Database) ๑ ๒ ๓ ๔ ๕

๖. การใช้คอมพิวเตอร์ Hardware อื่น ๆ (เช่น Scanners, Video, Slide maker) ๑ ๒ ๓ ๔ ๕

๗. การใช้โปรแกรมสำเร็จรูปที่ใช้สร้างงานศิลปะและงานออกแบบ (เช่น Pagemaker, Freehand, Illustrator, Image manipulation) ๑ ๒ ๓ ๔ ๕

๘. ใช้คอมพิวเตอร์ได้มากกว่าหนึ่งระบบ ๑ ๒ ๓ ๔ ๕

๙. ใช้เทคนิค Vector graphics (เช่น CAD/CAM และ Drawing Program) ๑ ๒ ๓ ๔ ๕

๑. หมายถึง ไม่สำคัญอย่างที่สุด

๒. หมายถึง ไม่สำคัญ

๓. หมายถึง สำคัญปานกลาง

๔. หมายถึง สำคัญมาก

๕. หมายถึง สำคัญมากที่สุด

.....

๑๐. ใช้เทคนิค Raster Graphics (เช่น Painting Programs)	๑ ๒ ๓ ๔ ๕
๑๑. การใช้ 2D Computer Graphics	๑ ๒ ๓ ๔ ๕
๑๒. การใช้ 3D Computer Graphics	๑ ๒ ๓ ๔ ๕
๑๓. การใช้เทคนิค 2D Computer Animation	๑ ๒ ๓ ๔ ๕
๑๔. การใช้เทคนิค 3D Computer Animation	๑ ๒ ๓ ๔ ๕
๑๕. ใช้เทคนิค วีดีโอกราฟฟิก	๑ ๒ ๓ ๔ ๕
๑๖. การใช้โปรแกรมสำเร็จรูปทางธุรกิจและการบริหารอื่น ๆ	๑ ๒ ๓ ๔ ๕

.....

ความรู้และทักษะในการใช้คอมพิวเตอร์อื่น ๆ ที่ไม่ได้กล่าวถึง

.....

.....

.....

หากท่านมีความประสงค์จะได้บทคัดย่อของการวิจัยในครั้งนี้ โปรดกรุณาเขียนชื่อ และสถานที่เพื่อการจัดส่งในภายหลัง

ชื่อ.....

สถานที่.....

.....

Appendix D

Cover Letter, First Mailing

(English and Thai Language Versions)

Date

Dear

I am a full-time faculty member at the Department of Fine and Applied Arts, Chulalongkorn University. I am conducting a study under the topic, "an assessment of computer utilization by graphics professionals." The purpose of this study is to investigate the use of computer technology in the fields of art and design. The data will be use to identify methods for the enhancement of the integration of computer technology into art and design programs at Chulalongkorn University. I am requesting your assistance to respond to the questionnaire for the assessment of computer utilization by graphics design professionals in Thailand. There are no correct or incorrect responses. Do not take too much time in thinking about any particular item. Please apply the appropriate code to indicate your response to each questionnaire item, and do not leave out any item.

All individual responses will be kept confidential. The number at the top of the questionnaire is merely to determine who returned the questionnaire, in case a second mailing is required to obtain an adequate sample size. Upon receipt, the number will be destroyed.

I would very much appreciate your completing the questionnaire and returning it to the address below, by August 27, 1992.

A copy of the results will be forwarded to you upon request.

Sincerely

Suprakorn Disatapundhu
Investigator

The Department of Creative Arts
Faculty of Fine and Applied Arts
Chulalongkorn University
Bangkok 10331
Tel. 250-0901

ภาควิชานฤมิตศิลป์
คณะศิลปกรรมศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย

10 สิงหาคม 2535

เรื่อง ขอความกรุณาในการตอบแบบสอบถาม

เรียน

ด้วยผม นายศุภกรณ์ ดิษฐพันธุ์ อาจารย์ประจำภาควิชานฤมิตศิลป์ คณะศิลปกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ขณะนี้ผมกำลังดำเนินการวิจัยในหัวข้อ การประเมินการใช้คอมพิวเตอร์โดยกลุ่มอาชีพกราฟฟิกดีไซน์ในประเทศไทย การทำวิจัยนี้มีวัตถุประสงค์เพื่อรวบรวมข้อมูลและนำผลของการวิจัยมาใช้เป็นพื้นฐานในการพัฒนาหลักสูตรคอมพิวเตอร์กราฟฟิกในคณะศิลปกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

โดยที่ท่านเป็นผู้ที่มีบทบาทสำคัญในการพัฒนาหลักสูตรคอมพิวเตอร์กราฟฟิกนี้ ผมจึงขอความอนุเคราะห์จากท่านช่วยกรุณาตอบแบบสอบถามฉบับนี้ตามความเป็นจริง แบบสอบถามนี้เป็นแบบสอบถามที่ไม่มีข้อถูกและผิด ผมขอให้ท่านตอบแบบสอบถามทุกข้อในแบบสอบถาม เพื่อการวัดผล ส่วนชื่อและสถานที่ทำงานของท่านบนแบบสอบถามของท่านนี้จะถูกปิดเป็นความลับ

ผมทราบดีว่าท่านมีภารกิจประจำวันมาก ผมจึงขอถือโอกาสนี้ขอบคุณท่านเป็นอย่างสูงในการที่ท่านช่วยอนุเคราะห์การวิจัยนี้ และผมขอความกรุณาจากท่านช่วยส่งแบบสอบถามนี้คืนตามสถานที่ที่ผมได้จัดพิมพ์เตรียมไว้ให้ท่านแล้ว ภายในวันที่ 27 สิงหาคม 2535 นี้

อนึ่ง ผมจะยินดีเป็นอย่างยิ่ง หากท่านมีความประสงค์จะได้บทคัดย่อของการวิจัยในครั้งนี้ ขอได้โปรดเขียนชื่อ ที่ทำงานหรือที่บ้าน ไว้ตอนท้ายของแบบสอบถามฉบับนี้ด้วย เพื่อการจัดส่งในภายหลัง

ขอแสดงความนับถือ

(นายศุภกรณ์ ดิษฐพันธุ์)

Appendix E

First Follow-Up Letter

(English and Thai Language Versions)

Date

Dear

Two weeks ago I requested your assistance to answer a questionnaire designed to gather information on the use of computers by graphics design professionals in Thailand. The purpose of this study is to investigate the use of computer technology in the fields of art and design. The data will be use to identify methods for the enhancement of the integration of computer technology into art and design programs at Chulalongkorn University. Until now your completed questionnaire has not been received. Would you please devote a portion of your valuable time to answering the questionnaire and return it before September 7, 1992.

If you have already returned the initial questionnaire, please disregard this request. Your assistance in this matter is greatly appreciated.

Thank you very much again for your assistance and time.

Sincerely

Suppakorn Disatapundhu
Investigator

The Department of Creative Arts
Faculty of Fine and Applied Arts
Chulalongkorn University
Bangkok 10331
Tel. 250-0901

ภาควิชานฤมิตศิลป์
คณะศิลปกรรมศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย

๗ กันยายน ๒๕๓๕

เรื่อง ขอความกรุณาในการตอบแบบสอบถาม

เรียน

เมื่อประมาณ ๒ สัปดาห์มาแล้ว ผมได้ขอความกรุณาจากท่านช่วยตอบแบบสอบถามเกี่ยวกับการประเมินการใช้คอมพิวเตอร์โดยกลุ่มอาชีพกราฟฟิกดีไซน์ในประเทศไทย จนกระทั่งบัดนี้ ผมยังไม่ได้รับแบบสอบถามกลับคืนมาเลย ผมจึงใคร่ขอความกรุณาจากท่านอีกครั้งหนึ่ง ขอท่านได้โปรดกรุณาตอบแบบสอบถาม และส่งแบบสอบถามกลับคืนมาให้ผมด้วย ภายในวันที่ ๗ กันยายน พ.ศ. ๒๕๓๕ นี้

การตอบแบบสอบถามของท่านนี้จะมีความสำคัญมากต่อการรวบรวมข้อมูลเพื่อใช้ในการพัฒนาวิชาคอมพิวเตอร์กราฟฟิก ในคณะศิลปกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ผมหวังเป็นอย่างยิ่งที่ท่านจะกรุณาตอบแบบสอบถามนี้ พร้อมกันนี้ผมได้จัดส่งแบบสอบถามมาให้ท่านใหม่อีกครั้งหนึ่ง เมื่อท่านได้ตอบแบบสอบถามเป็นที่เรียบร้อยแล้ว กรุณาส่งคืนให้กับผู้มีนามและสถานที่ที่ผมได้จัดพิมพ์มาให้ด้วยแล้ว และผมต้องขออภัยไว้ในโอกาสนี้ด้วยหากท่านได้ส่งแบบสอบถามกลับไปแล้ว

ผมขอขอบพระคุณเป็นอย่างสูงมา ณ โอกาสนี้ด้วย

ขอแสดงความนับถือ

(นายศุภกรณ์ ดิษฐพันธุ์)

Appendix F

Second Follow-Up Letter

(English and Thai Language Versions)

Date

Dear

Three weeks ago I requested your assistance to answer a questionnaire designed to gather information on the use of computer technology by graphics design professionals in Thailand. The purpose of this study is to investigate the use of computer technology in the fields of art and design. The data will be use to identify methods for the enhancement of the integration of computer technology into art and design programs at Chulalongkorn University. Until now your completed questionnaire has not been received. I have enclosed an additional questionnaire for your consideration. Would you please devote a portion of your valuable time to answering the questionnaire and return it before September 20, 1992.

If you have already returned the initial questionnaire, please disregard this request. Your assistance in this matter is greatly appreciated.

Thank you very much for your assistance and your time.

Sincerely

Suppakorn Disatapundhu
Investigator

The Department of Creative Arts
Faculty of Fine and Applied Arts
Chulalongkorn University
Bangkok 10331
Tel. 250-0901

ภาควิชานฤมิตศิลป์
คณะศิลปกรรมศาสตร์
จุฬาลงกรณ์มหาวิทยาลัย

๑๐ กันยายน ๒๕๓๕

เรื่อง ขอความกรุณาในการตอบแบบสอบถาม

เรียน

เมื่อประมาณ ๓ สัปดาห์มาแล้ว ผมได้ขอความกรุณาจากท่านช่วยตอบแบบสอบถามเกี่ยวกับการประเมินการใช้คอมพิวเตอร์โดยกลุ่มอาชีพกราฟฟิกดีไซน์ในประเทศไทย จนกระทั่งบัดนี้ ผมยังไม่ได้รับแบบสอบถามกลับคืนมาเลย ผมจึงใคร่ขอความกรุณาจากท่านอีกครั้งหนึ่ง ขอท่านได้โปรดกรุณาตอบแบบสอบถาม และส่งแบบสอบถามกลับคืนมาให้ผมด้วย ภายในวันที่ ๒๐ กันยายน พ.ศ. ๒๕๓๕ นี้

การตอบแบบสอบถามของท่านนี้จะมีความสำคัญมากต่อการรวบรวมข้อมูลเพื่อใช้ในการพัฒนาวิชาคอมพิวเตอร์กราฟฟิก ในคณะศิลปกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ผมหวังเป็นอย่างยิ่งที่ท่านจะกรุณาตอบแบบสอบถามนี้ พร้อมกันนี้ผมได้จัดส่งแบบสอบถามมาให้ท่านใหม่อีกครั้งหนึ่ง เมื่อท่านได้ตอบแบบสอบถามเป็นที่เรียบร้อยแล้ว กรุณาส่งคืนให้กับผู้มีนามและสถานที่ที่ผมได้จัดพิมพ์มาให้ด้วยแล้ว และผมต้องขออภัยไว้ในโอกาสนี้ด้วยหากท่านได้ส่งแบบสอบถามกลับไปแล้ว

ผมขอขอบพระคุณเป็นอย่างสูงมา ณ โอกาสนี้ด้วย

ขอแสดงความนับถือ

(นายศุภกรณ์ ดิษฐพันธุ์)