1989

Competencies required of baccalaureate degree graduates from graphic communications programs

Eldon B. Swanson
University of Northern Iowa

COMPETENCIES REQUIRED
OF
BACCALAUREATE DEGREE GRADUATES
FROM
GRAPHIC COMMUNICATIONS PROGRAMS

An Abstract of a Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Eldon B. Swanson

University of Northern Iowa

August 1989

ABSTRACT

The problem of this study was to identify and validate a list of competencies that may be used by graphic communications educators as the basis for curricula development that meets the needs of the contemporary graphic communications industry. The purpose of this study was to provide the graphic communications educator with a comprehensive, prioritized, and logically clustered list of competencies required of baccalaureate degree graduates from graphic communications programs as perceived by representatives from the graphic communications industry and graphic communications educators.

The survey instrument used for this study is based on a seven point graphic rating scale on which the 226 recipients were asked to respond to 108 individual items. The 108 items were divided into nine pooled variable groups of competencies for presentation and statistical data analyses. The individual items and groups were presented and analyzed under the following nine headings: (a) Future Issues, (b) Basic Awareness Issues, (c) Managerial Function Issues, (d) Design Issues, (e) Image Generation and Assembly Issues, (f) Photo-Conversion Issues, (g) Image Carrier Issues, (h) Image Transfer Issues, and (i) Finishing and Binding Issues.

Of the 208 surveys sent to individual industry representatives, 96 (46.15%) were returned. Educators returned 11 (61.11%) of 18 surveys. This represents a combined response rate of 47.35%. However, of the 107 responses received from the two populations surveyed, only 103 (45.58%) were usable responses.

Each of the 108 individual items and the nine pooled variable groups of competencies were statistically analyzed using a t-test for independent means (two-tailed) to determine if a significant mean value difference at the 0.05 level existed between the two populations. A significant mean value difference, as shown by a critical (ratio) t-value, was found to exist between the industry representatives and educators concerning their perceptions on all nine pooled variable groups of competency items. It is noteworthy that with 62 of the 108 individual items, the mean value difference was also significant at the 0.05 level. On 105 of the 108 items which constituted the nine pooled variable groups, the mean response value of items based on educators responses was higher than the mean response value of items based on industry representatives responses. The grand mean response value for the 108 items as perceived by educators was 5.472 while industry representatives grand mean response value was 4.464.

COMPETENCIES REQUIRED
OF
BACCALAUREATE DEGREE GRADUATES
FROM
GRAPHIC COMMUNICATIONS PROGRAMS

A Thesis

Submitted

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

Eldon B. Swanson

University of Northern Iowa

August 1989

This Study by: Eldon B. Swanson

Entitled: Competencies Required of Baccalaureate Degree Graduates From Graphic Communications Programs

has been approved as meeting the thesis requirement for the

Degree of Master of Arts--Technology (emphasis in Vocational-Technical Teaching)

Charles D. Johnson

8-3-89 _____
Date Chairman, Thesis Committee

E. A. Dennis

8-3-89 _____
Date Member, Thesis Committee

Roger A. Kueter

8-3-89 _____
Date Member, Thesis Committee

John W. Somervill

9-8-89 _____
Date Dean of the Graduate College

DEDICATED TO

MY DAUGHTER

TARA ANN

and

MY SON

TORY JAMES

ACKNOWLEDGMENTS

Taking this opportunity to reflect back over the year's work, I wish to thank those who have given of their time and effort to help make this thesis something of which I can be proud. With that thought in mind, I express appreciation to the following people.

First and most importantly to the lady that lives with me, Vicki, who set aside so many personal desires and interests to walk and work hand-in-hand with me through the completion of this research. Her assistance as a proofreader, typist, et cetera, cannot be repaid. Even more than that, her undoubting belief in and support of me, her continuous encouragement, and her ability to make our relationship so complete must be acknowledged with my deepest gratitude and love.

To my committee, Drs. Charles D. Johnson, E. A. Dennis, and Roger A. Kueter, for their guidance and invaluable criticism. A special thanks to Professor Dennis for his unflagging attention to detail and his willingness to provide assistance irrespective of his many other pressing responsibilities.

A special thanks must go to James A. Lynch and the Waverly Publishing Company and to James R. Frey and the Printing Industries of the Midlands, Inc. for their time and monies spent in support of this study. Also, I thank

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

APPENDIX Page

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

CHAPTER 1

THE PROBLEM OF THE STUDY

Information placing the study in its proper perspective is presented in this chapter. This information is found under the following headings: (a) Statement of the Problem, (b) Significance of the Problem, (c) Statement of Purpose, (d) Statement of Need, (e) Hypotheses, (f) Assumptions, (g) Limitations, (h) Definition of Terms, (i) Schedule for Study Completion, and (j) Budget for the Study.

Statement of the Problem

The problem of this study was to identify and validate a list of competencies that may be used by graphic communications educators for graphic communications technology curriculum development. The list of competencies refers only to baccalaureate degree graduates from graphic communications programs.

Significance of the Problem

The goal of an educator is to increase student competence in a predetermined area or subject (Miller & Rose, 1975). McKeachie (1986) stated there are many important goals of college and university teaching. However, in planning courses the most important goals are

the students' needs for success. Carl Rogers (1983), in discussing the philosophy of Martin Heidegger, noted that teaching is more difficult than learning because the teacher must learn in order to assist the student to learn and the teacher must be more teachable than the student.

Instructional objectives operationalize competencies and represent a clear statement of instructional intent. Objectives describe the kind of performance that will be expected of the student at the end of the course and educators generally recognize that achieving course objectives is a product as well as a process (Gillespie, 1983; Mager & Beach, 1967). The goal of the educator when developing course curricula is to direct the student toward becoming more competent as a result of the learning experiences.

The curriculum is the guide to achieving required competencies in a predetermined area or subject and provides the educator with predefined criteria for objective evaluation of his or her students. The long range objective of any curriculum is that the student will become competent in technical areas, and a large portion of that competency is occupational (Miller & Rose, 1975).

Educator Paul R. Gillespie, in addressing members of the International Graphic Arts Educational Association at Clemson University in August 1983, spoke to the necessity of laying a foundation upon which meaningful educational

changes could be made in order to keep educational curriculum current with a radically and rapidly changing industry so students would be more employable and more adaptable to change. He stated, "I feel that the printing industry is beginning to look to us for a new type of educated product. . . . Working together, we can build a bridge so that our students will be the beneficiaries" (Gillespie, p.11).

Because the graphic communications industry is experiencing tremendous technological changes which are influencing the need for new skills and new knowledge, Simich (1987) suggested that industry and schools must work more closely and cooperatively to produce better graphic communications programs and better students resulting in better employees. Twenty years earlier, Mager and Beach (1967) had stated that any course curriculum is effective to the degree that it sets out to do those things most related to the job or vocation to be taught. Industry representatives and educators need to work in closer harmony to develop viable employment-oriented curricula (Brown, 1983). This study supported previous findings and Brown also suggested that educators and industry personnel working together could lead to more effective and efficient curriculum development.

Glogovsky (1970) concluded that educational institutions are not completely changing to reflect modern

industrial graphic arts innovations. In addition, the present procedures most often used by graphic arts educators to obtain insight into and understanding of modern industrial practices are inadequate. Cox (1970) recommended that educators in graphic communications should secure summer employment in those areas of industry with which they are not completely familiar. These summer learning experiences could possibly improve their classroom performance.

Based on the review of literature in chapter 2, it appears that a major problem may be one of curriculum development. Recent growth in applications of competency-based higher education indicates a need to review the methodology applied in curriculum development (Brown, 1983). Previous researchers have found that graphic communications curriculum has been developed with limited input from industry personnel. For several decades, researchers have concluded that curricula developed with input from both industry representatives and educators may be the most effective and efficient (Bowling, 1984; Connor, 1986; Cox, 1970; Fecik, 1970; Glogovsky, 1970; Karsnitz, 1976; King, 1984; Rieth, 1966; Salvagin, 1974). This complementary curricula development by educators and industry representatives could assure students that they are "learning" contemporary competencies

which are perceived to be saleable skills and knowledge for the industry they intend to enter upon graduation.

Statement of Purpose

The purpose of this study was to provide educators working in the graphic communications technology area with a comprehensive, prioritized, and logically clustered list of competencies required of baccalaureate degree graduates from graphic communications programs as perceived by representatives of the graphic communications industry and graphic communications educators. Educators working in the area of graphic communications technology may then use the competency list as a basis for curricula development that meets the needs of the contemporary graphic communications industry and to then further refine programs with the identified competencies.

Curriculum developed from this list may then be synthesized and operationalized into specific behavioral objectives resulting in more occupationally competent students as evidenced by objective criterion-referenced evaluative instruments. This matching of classroom competency development to career competencies, as derived from the perceptions of industry representatives and educators, may then facilitate the development of effective and efficient competency-based course curriculum.

Statement of Need

The graphic communications industry is radically and rapidly changing technologically and these changes require new skills and new knowledge for both present and future employees (Gillespie, 1983). Educators who are charged with developing curricula face a difficult task without input from those persons who are involved in the industry where these changes are occurring (Bowling, 1984; Connor, 1986; Cox, 1970; Fecik, 1970; Glogovsky, 1970; Karsnitz, 1976; King, 1984; Salvagin, 1974).

An industry who's members require and are able to identify new technological competencies should have a part in cooperatively establishing curricula to teach the needed competencies. It has been shown through previous research that graphic communications industry personnel are, and have been, willing to work with educators in this endeavor (Brown, 1983; Connor, 1986; Cox, 1970; Salvagin, 1974). With the technological growth that is currently evident within the graphic arts industry, the day of having a curriculum that is based only on arbitrary decisions as to appropriate subject matter or course content (Karsnitz, 1976) is neither effective or efficient and, therefore, is not productive in terms of supplying a rapidly changing industry with competent employees.

The objective of the educator is to facilitate learning and that educator is successful only to the extent that his or her students learn what they need to know at the right time, rapidly, and well (Miller & Rose, 1975). Researchers have indicated that educators within graphic communications programs are not teaching in terms of identified "need-to-know" competencies but, rather, in terms of "nice-to-know" competencies (Brown, 1983; Cox, 1970; Fecik, 1970; Glogovsky, 1970; Karsnitz, 1976; Rieth, 1966; Salvagin, 1974).

Industry representatives suggest curricula based upon knowledge and skills required for industry specific entry-level competencies (King, 1984; Rieth, 1966; Salvagin, 1974; Simich, 1987). However, educators offer curricula based upon what they think should be taught or what they know or that for which they have equipment (Glogovsky, 1970; Karsnitz, 1976; Salvagin, 1974). As recommended by Salvagin (1974), curriculum and its development should evolve through the interaction of educators and industry representatives.

Hypotheses

Hypotheses were established for this study based upon the fact that supportive data exists. The following hypotheses are made in regard to this study:

H_1 It is hypothesized that competencies as perceived by representatives from the graphic communications industry and educators from graphic communications programs will show a significant difference in the mean value rating as measured by the survey instrument.

H_{01} It is hypothesized that there will be no significant difference in the mean value rating of competencies as perceived by representatives from the graphic communications industry and educators from graphic communications programs as measured by the survey instrument.

H_2 It is hypothesized that competencies as perceived by representatives from the graphic communications industry will show a significant difference in the mean value rating from the competencies as perceived and currently rated as being taught by educators from graphic communications programs as measured by the survey instrument.

H_{02} It is hypothesized that there will be no significant difference in the mean value rating of competencies as perceived by representatives from the graphic communications industry and competencies as perceived and currently rated as being taught by educators from graphic communications programs as measured by the survey instrument.

Assumptions

Certain assumptions were made in regard to this study and about the two populations who were asked to participate in it. The following assumptions were made:

1. Representatives from the graphic communications industry should have input into the method of determining content and the development of curriculum for higher education graphic communications programs (Brown, 1983; Connor, 1986; Cox, 1970; Elliott, 1979; Karsnitz, 1976; Rieth, 1966; Salvagin, 1974).

2. Graphic communications educators and industry representatives are in agreement with regard to the relationships between new technological developments and new skills and new knowledges being required for students within graphic communications programs (Anderson, 1983; Brown, 1983; Fecik, 1970; Gillespie, 1983; Glogovsky, 1970; Karsnitz, 1976; King, 1984; Rieth, 1966; Simich, 1987).

3. Graphic communications educators are currently teaching toward those competencies that they place high emphasis on as measured by the survey instrument.

Limitations

By its nature, this study required that certain limits be set. The following limitations were established in regard to this study:

1. Geographically, this study was limited to graphic communications educators and industry representatives within Iowa, Nebraska, and South Dakota.

2. The selected population of graphic communications industry representatives for the study came from the January 1989 membership listing of the Printing Industries of the Midlands Incorporated (Frey, 1989).

3. The selected population of graphic communications educators for the study was selected from the faculty listed in the 1988-89 (27th ed.) Industrial Teacher Education Directory (Dennis, 1988). Faculty members with position responsibilities in graphic communications, graphic arts, graphics, communications technology, electronic communications, communications, photography, and graphic design were identified to participate in this research.

4. The list of competencies as written in the survey instrument refer only to baccalaureate degree graduates from graphic communications programs.

Definition of Terms

Certain terms that were used in this study, although not unique to this study, are defined so that all readers may have a common basis for understanding their use within this study. The following terms are defined in regard to this study:

Achieve--to carry out successfully (Mish, 1987).

Achievement--accomplishment or proficiency of performance in a given skill or body of knowledge; progress in school (Good, 1973).

College--an institution of higher education that maintains a 4-year curriculum leading to the bachelor's degree (Good, 1973).

Competence, functional--ability to apply to practical situations the essential principles and techniques of a particular subject-matter field (Good, 1973).

Content--ideas or meanings presented, or to be presented, in speech or writing (Good, 1973).

Criteria--standards, norms, or judgments selected as a basis for quantitative and qualitative comparison (Good, 1973).

Curriculum--a systematic group of courses or sequences of subjects required for graduation or certification in a major field of study (Good, 1973).

Develop--to set forth or make clear by degrees or in detail (Mish, 1987).

Educator--a person who teaches, instructs, or otherwise contributes to the educational development of others; as often used, it implies a quality of achievement or performance higher than usual (Good, 1973).

Effective--producing a decided, decisive, or desired effect or result (Mish, 1987).

Efficient--to achieve the desired result(s) with economy of time and effort in relation to the amount of work accomplished (Good, 1973).

Evaluation--the process of ascertaining or judging the value or amount of something by use of a standard of appraisal; includes judgments in terms of internal evidence and external criteria (Good, 1973).

Graphic arts or graphic communications--the personnel, systems, and techniques used in communicating ideas, knowledges, and information in the production and servicing of industrial goods and encompassing the content of four areas: graphic image generation; graphic image reproduction; graphic image processing; and graphic image management (State of Iowa Department of Public Instruction, 1982).

Identify--to cause to be or become identical or to conceive as united in outlook or principle (Mish, 1987).

Instruction--in a precise sense, the kind of teaching that obligates the instructor to furnish the learner with some lasting direction and where the instructor is accountable for pupil performance commensurate with precise statements of educational objectives (Good, 1973).

Objective, instructional--a definitive learning specification in behavioral terms; it states exactly what the student should be able to do after having received the instruction (Good, 1973).

Performance--actual accomplishment as distinguished from potential ability (Good, 1973).

Postsecondary, institution--an institution of higher education offering programs of instruction and on-the-job experiences at the thirteenth and fourteenth grade levels and empowered to confer associate titles (Good, 1973).

Representative--a person who represents a business organization (Mish, 1987).

Technology--a scientific method of achieving a practical purpose (Mish, 1987).

Technical education--a program of education below college grade organized to prepare the learner to earn a living in an occupation in which success is dependent largely upon technical information and an understanding of the laws of science and technology (Good, 1973).

University--an institution of higher education consisting of a liberal arts college, offering a program of graduate study, and having usually two or more professional schools or faculties and, empowered to confer degrees in various fields of study (Good, 1973).

Validate--to support or corroborate on a sound or authoritative basis (Mish, 1987).

Verify--to establish the truth, accuracy, or reality of something (Mish, 1987).

Vocational education--a program of education below college grade organized to prepare the learner for entrance into a particular chosen vocation (Good, 1973).

Schedule for Study Completion

The following schedule was prepared to facilitate the completion of this study in a timely fashion. The schedule for the research completion was as follows:

1. Completion of thesis proposal draft for committee review by October 30, 1988.

2. Formal written approval of survey instrument use from Dr. John R. Karsnitz by October 30, 1988.

3. Written approval of thesis proposal and instrument use by thesis advisor, Dr. Charles D. Johnson, and committee members by January 30, 1989.

4. Completion of sample printed instrument, explanatory cover letter, letter of support, mailing label, and return envelope by February 20, 1989.

5. Written approval of printed materials by thesis advisor and committee members by February 28, 1989.

6. Completion of printed materials by April 15, 1989.

7. Initial mailing to the two selected populations by May 1, 1989.

8. Mail follow-up postcard, as required, to non-respondents by May 11, 1989.

9. Cut-off date for response inclusion in data analysis and presentation was June 1, 1989.

10. Completion of data analysis by June 20, 1989.

11. Completion of written rough draft of thesis for thesis advisor and committee members review by July 3, 1989.

12. Oral defense and acceptance of same by thesis advisor and committee members by July 19, 1989.

13. Completion of final draft of thesis for thesis advisor and committee members review by August 4, 1989.

14. Written approval of final thesis draft by thesis advisor and committee members by August 4, 1989.

15. Completion and acceptance of thesis for thesis advisor, committee members, department, University of Northern Iowa library, and Graduate College by August 25, 1989.

Budget for the Study

The budget that follows was prepared assuming the entire populations would receive all materials. The first category of costs included expenses related to the typesetting and printing of the survey instrument, introductory and support letters, mailing and return envelopes, mailing labels, and postage on both the mailing and return envelopes. Category two expenses were allocated for the follow-up reminder postcards, mailing labels, and

postage. Printing and/or copying of the approved thesis make up category three costs. The budget as prepared in regard to monies required to satisfactorily complete this research follows:

Category One

LABELS	904 X .02	$18.08	
LETTERS	452 X .02	$9.04	
ENVELOPES	452 X .05	$22.60	
POSTAGE	226 X .65	$146.90	
RETURN POSTAGE	226 X .45	$101.70	
TYPESETTING	1 X	$200.00	
PRINTING	1 X	$500.00	
			$998.32

Category Two

POSTAGE	151 X .15	$22.65	
POSTCARDS	151 X .05	$7.55	
LABELS	151 X .02	$3.02	
			$33.22

Category Three

PRINTING FINAL COPIES	$200.00	
		$200.00

Totals Category

TOTAL COST OF STUDY. $1281.54

Summary

The problem of this study was to identify and validate a list of competencies that may be used for curricula development that meets the needs of the contemporary graphic communications industry. The purpose of this study was to provide educators with a comprehensive, prioritized, and logically clustered list of competencies required of baccalaureate degree graduates from graphic communications programs as perceived by industry and education representatives from graphic communications.

The goal of an educator is to increase a student's functional competence in a predetermined area or subject and the long range objective of any curriculum is that the student will become competent in technical areas, and a large portion of that competency is occupational. It may be said that curriculum and instruction are effective to the degree that they set out to teach students those things most related to the job or vocation and the performance or achievement of the student must be verified through evaluation of his/her work. Industry representatives suggest curricula based upon knowledge and skills required for specific entry-level competencies, while educators arbitrarily offer curricula based upon what they think should be taught, what they know, or what equipment they have available.

Researchers have suggested that curricula developed with input from both industry representatives and educators may be the most effective and efficient and that curriculum development should evolve through the interaction of these two groups. Major technological changes which are occurring within the graphic communications industry are influencing the need for new skills and new knowledges. Educators who are charged with developing curricula face a difficult task without input from persons in the industry where these changes are occurring. The on-going changes in technology may require on-the-job technical education. But, this synergetic development of curricula for current programs assures students that they are "learning" relevant competencies or skills which are saleable.

CHAPTER 2

REVIEW OF THE RELATED LITERATURE

A comprehensive review of the literature related to competencies, curriculum development, technology and graphic communications education is presented in this chapter. The material has been synthesized and is presented under several headings relating to the documented literature. The three chapter divisions are: (a) Education and Industry Cooperation, (b) Technological Innovation and Education, and (c) Curricular Uniformity.

Education and Industry Cooperation

Concern about the successful interpretation of the graphic communications industry by graphic communications educators has been voiced for a number of years. In 1986, Connor stated that educators should evaluate present curricula in order to better interpret and simulate industry. Sixteen years earlier, Fecik (1970) wrote that educators must attempt to investigate new industrial techniques and processes and incorporate these findings into their programs. In that same year, Glogovsky (1970) stated that the present procedures most often used by graphic communications educators to obtain insight into and understanding of modern industrial practices were inadequate.

It may be fair to say that educators need to analyze the educational objective that is used to develop and maintain in the student an active interest in the contemporary graphic communications industry, if in fact such an objective exists (Meline, 1965). In 1979, Elliott found that faculty were generally lacking in relevant industrial experience. This shortage or lack of experience may explain the want of such an objective and/or the general lack of confidence in existing programs expressed by some representatives from the graphic communications industry (Cox, 1970). Cox also found that a number of items in graphic communication education were not receiving the emphasis in the classroom that employers thought they should receive. At this same time industry representatives and employers expressed a desire to cooperate with graphic communications educators to improve programs (Brown, 1983; Connor, 1986; Cox, 1970; Salvagin, 1974).

Cooperative support between industry personnel and educators was found by Brown (1983) and Connor (1986) to be an appropriate method to use in developing curricula. This concurs with the findings of Bowling (1984) who reported that industry representatives could identify curriculum needs for graphic communications programs. Salvagin (1974) recommended that curriculum content and development should evolve through the interaction of educators and industry representatives. Fecik (1970) found that industry could

provide additional support by publishing materials for educational use in graphic communications programs. Additionally, Fecik suggested that educators should avail themselves of the material that industry does produce in order to keep up with the rapid technological growth in the graphic communications industry.

Technological Innovation and Education

The rapid rate of change in regard to technological innovations also affects curricula needs. Over 20 years ago, Rieth (1966) suggested that technological developments within the graphic communications industry had greatly increased the need for new skills and new knowledge and he identified desirable competencies that could serve as the criteria for evaluating and/or developing graphic communications course content. In 1970, Glogovsky found programs were not completely changing to reflect modern industrial graphic arts innovations. Gillespie (1983) spoke to the necessity of laying a foundation upon which meaningful educational changes could be made in order to keep education abreast of this radically and rapidly changing industry. Simich (1987) echoed the words of Rieth from 20 years earlier when he stated that the graphic communications industry was experiencing tremendous technological changes and these changes were influencing the need for new skills and new knowledges. Today, with

the advent of computers, desktop publishing, and other revolutionary--not just evolutionary--changes within the graphic communications industry, the situation appears to be dramatically more intense. Educators must work toward developing curricula that best interprets and simulates the contemporary graphic communication industry for the student (Brown, 1983; Cox, 1970; Elliott, 1979; Salvagin, 1974).

Curricular Uniformity

Another problem exposed during the review of literature was the lack of uniformity in course offerings and curricular content in graphic arts programs (Glogovsky, 1970). Anderson (1983) concurred when, in his analysis of data, he found that differences existed in several areas of graphic communications in regard to instructional emphasis placed on a given set of behavioral objectives. He additionally found that instructional emphasis within programs, from institution to institution, showed significant differences.

Fecik (1970) concluded that a need existed for the graphic communications industry and graphic communications educators to agree on a common terminology. As was noted by Blair (1983), terminology had neither been generally accepted nor consistent throughout the history of graphic communications. In a national survey, Karsnitz (1976) found that there was a genuine lack of concern about the

necessity for a structured body of knowledge for graphic arts and present programs were based on arbitrary decisions made by educators as to appropriate subject matter. He also reported that a major concern of educators was the general lack of acceptance of common boundaries from which a knowledge base for the discipline of graphic arts or graphic communications could be derived. In addition, Karsnitz concluded that programs must be able to withstand critical analyses of both their source of content and content structure.

Because consistent direction should be provided through educational programs, Elliott (1979) recommended formation of a joint education-industry group to organize an accreditation association for graphic communications programs. The idea of an accrediting body was further supported by Brown (1983). No data could be found to support that a joint accrediting association has ever been formed.

Summary

The need for representatives of the graphic communications industry and educators to work cooperatively in establishing curricula that best meets the needs of students, educators, and industry was addressed time and again in the literature. In addition, it is apparent that changing technologies do require new knowledge and skills

to be taught. Finally, there is a need for graphic communications industry and education representatives to cooperatively develop a more contiguous competency-based graphic communications curriculum.

CHAPTER 3

METHODS AND PROCEDURES

The general methods and procedures used for this study are described in this chapter. The chapter headings are as follows: (a) The Populations, (b) Instrumentation Used in the Study, (c) Statistical Analyses and Presentation, (d) Initial Survey Mailing, and (e) Follow-up Procedure.

The Populations

There were two distinct populations surveyed for this study. The first being graphic communications industry representatives who were members of the Printing Industries of the Midlands Incorporated and who were located within the geographic borders of Iowa, Nebraska, and South Dakota. Each of the members from the January 1989 membership list received the survey instrument (Appendix A), an explanatory cover letter (Appendix C), and a letter of support written by James R. Frey, President of the Printing Industries of the Midlands Incorporated (Appendix D). This population represented 208 industry representatives.

The second population for this study was graphic communications educators who were listed in the 1988-1989 (27th ed.) Industrial Teacher Education Directory (Dennis, 1988) as faculty with teaching responsibilities listed in graphic communications, graphic arts, graphics,

communications technology, electronic communications, communications, photography, and graphic design and who were located within the geographic borders of Iowa, Nebraska, and South Dakota. Each of these educators received the survey instrument, an explanatory cover letter, and a letter of support written by James R. Frey, President of the Printing Industries of the Midlands Incorporated. The population of this group was 18 educators.

Instrumentation Used in the Study

The survey instrument (Appendix A) for this study was based upon section three of the instrument developed and subsequently used by Dr. J. R. Karsnitz (1976) in his national survey to determine the status of programmatic offerings in graphic arts teacher education and its relationship to a validated body of knowledge. With his approval (J. R. Karsnitz, personal communication, November 17, 1988) (Appendix E), the 108 individual items were modified for use in this study. Modification of the items was made only after receiving the approval of Dr. Karsnitz and subsequent discussions with the thesis committee.

The survey instrument is based on a seven point graphic rating scale. Respondents were asked on the survey instrument to indicate the degree of emphasis they believed should be placed on each item as it related to graphic

communications programs at the college and/or university level. On the seven point graphic rating scale, a response of one (1) indicated low emphasis while a response of seven (7) indicated high emphasis.

The 108 individual items on the survey instrument were divided into nine pooled variable groups (group of individual variables, i.e. items, relating to a particular competency area) for presentation and analyses. Each pooled variable group (Appendix B) represented a competency area within graphic communications. The number of items within each pooled variable group ranged from a high of 30 to a low of 5. The pooled variable groups are presented and analyzed in chapter 4 under the following headings: (a) Future Issues based on survey items 1 through 5, 8 through 10, 14, 55 and 56; (b) Basic Awareness Issues based on survey items 6, 7, 12, 13, 16 through 19, 21 and 25; (c) Managerial Function Issues based on survey items 15, 20, 22, 35 through 54, and 102 through 108; (d) Design Issues based on survey items 23 and 26 through 30; (e) Image Generation and Assembly Issues based on survey items 24, 31, and 58 through 69; (f) Photo-Conversion Issues based on survey items 70 through 76; (g) Image Carrier Issues based on survey items 77 through 87; (h) Image Transfer Issues based on survey items 11, 32 through 34, 57, and 88 through 96; (i) Finishing and Binding Issues based on survey items 97 through 101.

Statistical Analyses and Presentation

The numerical data received from individual respondents in regard to the 108 items were transferred to optical scanner sheets for computer compilation and statistical treatment. Statistical computations were made using the Statistical Package for the Social Sciences (SPSS) software. The 108 individual items and the nine pooled variable groups were analyzed using a t-test for independent means (two-tailed) to determine if a significant mean value difference (Shavelson, 1988) at the 0.05 level existed between the two populations.

The presentation and analyses of data, including the rank ordering of the competencies as perceived by the two populations, is presented in chapter 4. The issues of conclusions and recommendations are addressed in chapter 5.

Initial Survey Mailing

The initial mailing of the survey instrument and two supporting documents along with a postage paid return envelope was made on Monday morning May 1, 1989. A total of 226 surveys were mailed and represented the total of the two selected population groups. The survey instruments were printed with a five digit code number to identify respondents and non-respondents while at the same time maintaining their anonymity. The 18 educators received

instruments with the code numbers 00101 through 00118 and the 208 industry representatives received instruments with the code numbers 00119 through 00326. Individuals were asked in the explanatory cover letter to return the completed survey within five days of receipt. An acceptable return response rate for data presentation and analyses was set at 102 (45%) of the 226 instruments mailed (Clover & Balsley, 1984). Additionally, it was determined that a follow-up postcard reminder would be sent to non-respondents after 10 calendar days if the return response level had not reached 45%.

Follow-up Procedure

The follow-up procedure began 10 calendar days after the initial mailing with a reminder postcard (Appendix F). This was sent out on May 11, 1989 requesting non-respondents to complete and return the survey upon receipt of the reminder. Due to the fact that 75 (33.19%) instruments had been returned, 151 postcard reminders had to be mailed on May 11, 1989. This follow-up mailing represented 66.81% of the 226 persons in the two populations. Lastly, a cut-off date for accepting responses for inclusion in the presentation and analyses of data was set for June 1, 1989.

Summary

There were two distinct populations to this study. The first was made up of 208 graphic communications industry representatives and the second was made up of 18 graphic communications educators. Both populations were located within the geographic borders of Iowa, Nebraska, and South Dakota.

Each of the 226 individuals received the survey instrument via the United States mail, an explanatory cover letter, and a letter of support written by the president of the Printing Industries of the Midlands Incorporated. The instrument was based upon section three of a research instrument developed and used in a national survey. The instrument is based on a seven point graphic rating scale on which respondents were asked to indicate the degree of emphasis they believed should be placed on each item.

The 108 items were divided into nine groups for presentation and analyses of data. The 108 individual items and the nine pooled variable groups were analyzed using a t-test for independent means (two-tailed) at the 0.05 level to determine if a significant mean value difference existed between the two populations.

Individuals were asked to respond to the survey within five days of receipt. An acceptable rate of return for analyses of data was set at 102 (45%) surveys. Follow-up

reminder postcards were sent to non-respondents 10 calendar days after the initial mailing date.

CHAPTER 4

PRESENTATION AND ANALYSES OF DATA

The data collected from 103 usable responses received from the two populations, 10 from graphic communications educators and 93 from graphic communications industry representatives, are presented and analyzed in this chapter. The data in regard to the 108 individual items and the nine pooled variable groups were analyzed using a t-test for independent means (two-tailed) at the 0.05 level to determine if a significant mean value difference existed between the two populations. Rank-order tables were constructed, based upon the calculated mean response value, for each of the populations. In addition, a rank-order table comparing the two populations perceptions was developed to ensure clarity of the individual rank-order tables. In addition, findings in regard to the data analyses are presented.

Response Rate

Of the 226 surveys mailed to the two populations on May 1, 1989, industry representatives returned 96 (46.15%) of 208 surveys and educators returned 11 (61.11%) of 18 surveys. This represents a combined response rate of 47.35%. It must be noted, that two (0.021%) of the 96 industry representatives responded after the cut-off

response date (June 1, 1989) and consequently were not included in this study. This meant that 105 (46.46%) surveys remained for statistical data analyses.

The 105 respondents represented 46.46% of the total populations. However, two (0.02%) of the 105 respondents, one educator and one industry representative returned the survey instrument without answering any of the 108 items. The industry representative, an associate member of the Printing Industries of the Midlands Incorporated was not directly involved in day-to-day graphics activities and for that reason the individual believed it would be best to return the survey unanswered. The educator was listed in the Industrial Teacher Education Directory (Dennis, 1988) as a faculty member with graphic communications teaching responsibilities but did not have responsibilities in the area of graphic communications. After consultation with the department head, the educator returned the survey unanswered.

The 103 remaining surveys, representing 45.58% of the two populations, were statistically analyzed and the data from them were the basis for the tabular information that follows. Unanswered items were treated as missing data in regard to analyses. Statistician B. G. Rogers noted that the length of the survey instrument, 108 items, could or would enter into the process of drawing inferences to the two populations. This would be especially true in regard

to making determinations of similarity of respondents to non-respondents (B. G. Rogers, personal communication, June 16, 1989).

Respondents were asked to list other areas of concern in relationship to graphic communications curriculum development. No concerns were voiced that had not already been considered in the pooled groups. Additionally, the respondents were asked to list job titles and areas of responsibility on the instrument. The job titles and percentages of respondents listing each title by population may be found in Appendix G.

Disparate Population Size

The two populations surveyed were disparate in size. The population of educators (18) was equal to 8.65% of the population of industry representatives (208). As with any small population like the educators, any change in the demographic makeup of the population could or would change the inferences that might be drawn from the data groups (B. G. Rogers, personal communication, June 16, 1989).

Individual Items and Item Groups

The data presentation and analyses concerning the 108 individual items that make up the nine groups is found in Appendix B (Tables B-1 through B-9). The data were presented under the following headings: (a) Future Issues,

(b) Basic Awareness Issues, (c) Managerial Function Issues, (d) Design Issues, (e) Image Generation and Assembly Issues, (f) Photo-Conversion Issues, (g) Image Carrier Issues, (h) Image Transfer Issues, and (i) Finishing and Binding Issues.

The tabular data presented for each item includes: (a) the identity of the responding population (Type) with the letter E representing educators and the letter I representing industry personnel, (b) the number (n) of respondents from each population, (c) a mean response value (m) for each population, (d) a standard deviation value (sd), and (e) a pooled variance t-value (t). Significant mean value difference between the two populations at the 0.05 level, as shown by a critical (ratio) t-value (Shavelson, 1988), is noted with an asterisk (*).

The data analyses concerning the nine pooled variable groups were presented tabularly in the same order as the individual item groups. The table headings remained the same, with one exception. Instead of listing a mean value (m) as was done for individual items, a summed mean response value (sm) for each population was derived for each item group by adding together the mean response values of the individual items within the group.

Rank-ordering tables were constructed based upon the mean response value of each item by population and are presented in this chapter. In addition, a rank-order table

was constructed that compares the rank-ordering of the two populations.

Future Issues

Items 1 through 5, 8 through 10, 14, 55, and 56 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to future issues in graphic communications. The data concerning this pooled variable group is presented in Table 1.

Table 1

Future Issues Group Analysis

Type	n	sm	sd	t
E	10	60.000	8.069	2.59*
I	87	52.805	8.347	

Note. * significant mean difference at the 0.05 level.

Basic Awareness Issues

Items 6, 7, 12, 13, 16 through 19, 21 and 25 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to basic awareness issues in graphic

communications. The data concerning this pooled variable group is presented in Table 2.

Table 2

Basic Awareness Issues Group Analysis

Type	n	sm	sd	t
E	10	53.800	7.885	3.21*
I	89	44.494	8.770	

Note. * significant mean difference at the 0.05 level.

Managerial Function Issues

Items 15, 20, 22, 35 through 54, and 102 through 108 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to managerial function issues in graphic communications. The data concerning this pooled variable group is presented in Table 3.

Design Issues

Items 23, and 26 through 30 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in

regard to design issues in graphic communications. The data concerning this pooled variable group is presented in Table 4.

Table 3

Managerial Function Issues Group Analysis

Type	n	sm	sd	t
E	10	159.700	14.236	2.06*
I	86	141.640	27.208	

Note. * significant mean difference at the 0.05 level.

Table 4

Design Issues Group Analysis

Type	n	sm	sd	t
E	9	39.222	2.279	3.95*
I	91	30.791	6.336	

Note. * significant mean difference at the 0.05 level.

Image Generation and Assembly Issues

Items 24, 31, and 58 through 69 of the survey were grouped together and analyzed to determine if a significant

mean value difference existed between the two populations in regard to image generation and assembly issues in graphic communications. The data concerning this pooled variable group is presented in Table 5.

Table 5

Image Generation and Assembly Issues Group Analysis

Type	n	sm	sd	t
E	9	70.333	10.989	3.90*
I	92	55.207	11.129	

Note. * significant mean difference at the 0.05 level.

Photo-Conversion Issues

Items 70 through 76 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to photo-conversion issues in graphic communications. The data concerning this pooled variable group is presented in Table 6.

Image Carrier Issues

Items 77 through 87 of the survey were grouped together and analyzed to determine if a significant mean

value difference existed between the two populations in regard to image carrier issues in graphic communications. The data concerning this pooled variable group is presented in Table 7.

Table 6

Photo-Conversion Issues Group Analysis

Type	n	sm	sd	t
E	10	42.300	4.218	3.41*
I	92	33.315	8.181	

Note. * significant mean difference at the 0.05 level.

Table 7

Image Carrier Issues Group Analysis

Type	n	sm	sd	t
E	10	53.300	12.597	3.13*
I	86	40.140	12.592	

Note. * significant mean difference at the 0.05 level.

Image Transfer Issues

Items 11, 32 through 34, 57, and 88 through 96 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to image transfer issues in graphic communications. The data concerning this pooled variable group is presented in Table 8.

Table 8

Image Transfer Issues Group Analysis

Type	n	sm	sd	t
E	8	78.375	9.942	3.62*
I	87	59.322	14.551	

Note. * significant mean difference at the 0.05 level.

Finishing and Binding Issues

Items 97 through 101 of the survey were grouped together and analyzed to determine if a significant mean value difference existed between the two populations in regard to finishing and binding issues in graphic communications. The data concerning this pooled variable group is presented in Table 9.

Table 9

Finishing and Binding Issues Group Analysis

Type	n	sm	sd	t
E	10	30.200	3.293	3.19*
I	92	24.446	5.585	

Note. * significant mean difference at the 0.05 level.

Rank-Order of Individual Items by Industry Representatives

Respondents were asked on the survey to indicate the degree of emphasis they believed should be placed on each item in relationship to graphic communications programs at the college and/or university level. A seven point graphic rating scale was employed for denoting the degree of emphasis which the respondent believed the item should receive, with a response of one (1) indicating low emphasis up through seven (7) indicating high emphasis. In Table 10 a rank-ordering of the 108 individual items as perceived by graphic communications industry representatives is presented. The rank-ordering was based on the mean response value for each item as calculated from the responses received from the 93 industry representatives who returned the survey instrument. Items having the same mean

response value were listed in the numerical order in which they appeared in the instrument (Appendix A).

Table 10

Rank Order of Individual Items by Industry Representatives

Rank	Mean	Item	
1.	6.065	20.	Learn about client wants and needs.
2.	5.815	22.	Learn about production variables (e.g., cost, time, process, materials used, etc.).
3.	5.674	30.	Study positioning of elements, (e.g., registration, bleeding, cropping, over-printing, reverse-printing, key lining, etc.).
4.	5.667	65.	Study about generating images with electronic techniques.
5.	5.620	14.	Consider the future role of the computer and CRT for communicating printed information.
6.	5.527	36.	Learn about scheduling for product production.
7.	5.516	72.	Learn about photo-converting images through process color separating.
8.	5.500	33.	Know about the capabilities and capacities of reproduction methods and processes.
9.	5.419	34.	Reflect upon methods of reproduction best suited for product based on nature of the product.

Table 10 (continued)

Rank	Mean	Item	
10.	5.409	32.	Study about the advantages and disadvantages of the reproduction methods and processes.
11.	5.366	2.	Learn about potential change in the production technology of the graphic communication industry.
12.	5.323	35.	Study estimating procedure.
13.	5.323	49.	Learn about inspecting procedures by proofing relief forms, proofing photographically, color keying, etc.
14.	5.323	71.	Learn about photo-converting images through halftone techniques.
15.	5.283	82.	Study about preparing image carriers through electronic scanning.
16.	5.280	28.	Learn about a signature or dummy.
17.	5.280	105.	Study training methods used to prepare personnel for the graphic communication industry.
18.	5.226	68.	Learn about assembling images by making a mechanical.
19.	5.250	48.	Study about production coordination.
20.	5.194	70.	Learn about photo-converting images through line negative techniques.
21.	5.172	31.	Know about copyfitting procedures.
22.	5.140	8.	Study where automation may provide economical efficiency in the graphic communication industry.
23.	5.108	47.	Study about production supervision.
24.	5.108	98.	Study about finishing products through binding.

Table 10 (continued)

Rank	Mean	Item	
25.	5.075	15.	Learn how market analysis is used to determine the needs for various graphic communication products.
26.	5.054	23.	Know aesthetic design principles (e.g., balance, proportion, contrast, rhythm, unity, etc.).
27.	5.032	99.	Study about finishing products through sizing and pre-assembly (e.g., scoring, folding, perforating, etc.).
28.	5.022	29.	Learn about scaling or gridding.
29.	5.022	69.	Learn about assembling images by imposing.
30.	5.011	27.	Know about design process (e.g., thumbnail sketch, rough layout, comprehensive layout).
31.	5.011	96.	Know about transferring images through photographic techniques.
32.	4.978	100.	Study about finishing products through special processes (e.g., die-cutting, embossing, gumming, etc.).
33.	4.968	19.	Know about the influence of the economic conditions on the graphic communication industry (e.g., inflation, recession, new equipment purchases, etc.).
34.	4.968	64.	Study about generating images with photographic techniques.
35.	4.968	73.	Learn about photo-converting images through facsimile scanning.
36.	4.925	97.	Study about finishing products through assembly.

Table 10 (continued)

Rank	Mean	Item	
37.	4.871	52.	Learn about compiling records for controlling production.
38.	4.860	18.	Study the influence of governmental regulations on the graphic communication industry (e.g., inter- and intra-state regulations, copywriting, etc.).
39.	4.860	67.	Study about generating images with creative photography (continuous tone).
40.	4.839	16.	Know the classifications by printed products within the graphic communication industries and the type of work done by each division.
41.	4.839	38.	Know about analyzing work tasks.
42.	4.839	51.	Know how production is monitored through timekeeping.
43.	4.806	66.	Study about generating images with illustration techniques.
44.	4.796	26.	Study perceptual principles (e.g., figure/ground relationship, typography, color, density, etc.).
45.	4.796	54.	Learn about characteristics of materials, processes, and/or equipment.
46.	4.793	4.	Consider broad changes that may occur in the graphic communication industry, excluding new materials and equipment.
47.	4.793	55.	Study by experimenting with materials, processes, and/or equipment.
48.	4.772	5.	Consider new potential system areas based on existing systems.

Table 10 (continued)

Rank	Mean	Item	
49.	4.728	12.	Reflect on how the industry might better process large quantities of information.
50.	4.710	53.	Know how to retrieve information about materials, processes, and/or equipment.
51.	4.688	39.	Know about determining worker functions.
52.	4.685	104.	Study hiring practices of the graphic communication industry.
53.	4.656	45.	Study routing procedures for production.
54.	4.645	40.	Learn about establishing worker roles.
55.	4.641	106.	Study working conditions within the graphic communication industry.
56.	4.624	10.	Know about potential retrieval mechanisms for printed and non-printed information.
57.	4.591	57.	Reflect upon alternative materials for production.
58.	4.581	41.	Learn about determining worker conditions.
59.	4.571	9.	Consider the potential storage mechanisms for printed and non-printed information.
60.	4.560	86.	Study about preparing image carriers through mechanical techniques (direct image, etc.).
61.	4.543	6.	Study the advantages and disadvantages of the printed message as a way of communicating in the communication and information business.

Table 10 (continued)

Rank	Mean	Item	
62.	4.495	107.	Consider what vertical job mobility exists within the graphic communication industry.
63.	4.441	3.	Learn about future trends based on the past nature of the graphic communication industry.
64.	4.441	11.	Consider the role of the electrostatic technique (e.g., xerography) in the future of the graphic communication industry.
65.	4.435	101.	Study about finishing products through packaging.
66.	4.402	1.	Forecast the future of the graphic communication industry by prognosticating the nature of the printed message in the year 2000.
67.	4.387	50.	Know about inventorying procedures.
68.	4.344	56.	Know about scarce resources or how to conserve existing resources.
69.	4.341	83.	Study about preparing image carriers through electrostatic processes.
70.	4.301	13.	Learn where efficient systems are used with inefficient systems in the processing of information in the graphic communication industry.
71.	4.301	102.	Study about distributing products by storing (e.g., protecting, labeling, inventorying).
72.	4.261	21.	Reflect upon audience variables, (e.g., social, cultural, educational level, language, economic level, age, etc.).
73.	4.261	76.	Learn about photo-converting images through photostabilization.

Table 10 (continued)

Rank	Mean	Item	
74.	4.233	85.	Study about preparing image carriers through photopolymers.
75.	4.228	46.	Learn about storing materials based on the qualities of those materials.
76.	4.207	91.	Know about transferring images through screen printing.
77.	4.118	74.	Learn about photo-converting images through thermography.
78.	4.075	25.	Know about communication theory: source, encode, transmit, receive, decode, feedback, and interference.
79.	4.075	75.	Learn about photo-converting images through xerography.
80.	4.011	43.	Know about procuring procedures.
81.	4.011	44.	Study about subcontracting procedure.
82.	3.968	24.	Study classifications of symbols (e.g., images, language related symbols, image related symbols, arbitrarily related symbols, concept related symbols, etc.).
83.	3.914	42.	Study requisitioning procedures.
84.	3.911	94.	Know about transferring images through light absorbency techniques.
85.	3.870	108.	Reflect upon procedures which are used for retiring personnel and typical benefits accrued.
86.	3.859	103.	Study about distributing by shipping.
87.	3.846	89.	Know about transferring images through intaglio.

Table 10 (continued)

Rank	Mean	Item	
88.	3.804	84.	Study about preparing image carriers through heat transfer.
89.	3.785	17.	Study the effect of the social environment on the graphic communication industry (e.g., declining birth rate).
90.	3.756	90.	Know about transferring images through planography.
91.	3.717	7.	Consider alternatives to the printed message, and reflect on the ramifications of a city without a daily newspaper.
92.	3.717	62.	Study about generating images with preprinted and clip art techniques.
93.	3.696	93.	Know about transferring images through electrostatic processes.
94.	3.656	37.	Study how to acquire licenses, permits, copyrights, etc.
95.	3.641	95.	Know about transferring images through heat absorbency techniques.
96.	3.140	78.	Study about preparing image carriers through photoengraving.
97.	3.124	77.	Study about preparing image carriers through lock-up techniques.
98.	3.111	88.	Know about transferring images through relief.
99.	3.075	79.	Study about preparing image carriers through engraving.
100.	3.022	81.	Study about preparing image carriers through electroplating.

Table 10 (continued)

Rank	Mean	Item	
101.	2.946	63.	Study about generating images with strike-on techniques.
102.	2.870	80.	Study about preparing image carriers through molding.
103.	2.848	92.	Know about transferring images through office duplicator (e.g., mimeography, spirit, gelatin).
104.	2.780	87.	Study about preparing image carriers through stencils.
105.	2.348	60.	Study about generating images with automatic machine casting units.
106.	2.226	58.	Study about generating images with foundry type.
107.	2.207	59.	Study about generating images with manually operated machine casting units.
108.	2.196	61.	Study about generating images with conversion processes for hot composition.

Note. Grand mean response value = 4.464

Rank-Order of Individual Items by Educators

In Table 11 a rank-ordering of the 108 individual items as perceived by graphic communications educators is presented. The rank-ordering was based on the mean response value for each item as calculated from the

responses received from the 10 educators who returned the survey instrument. Items having the same mean response value were listed in the numerical order in which they appeared in the instrument.

Table 11

Rank Order of Individual Items by Educators

Rank	Mean	Item	
1.	6.800	27.	Know about design process (e.g., thumbnail sketch, rough layout, comprehensive layout).
2.	6.700	30.	Study positioning of elements (e.g., registration, bleeding, cropping, over-printing, reverse-printing, key lining, etc.).
3.	6.700	65.	Study about generating images with electronic techniques.
4.	6.700	70.	Learn about photo-converting images through line negative techniques.
5.	6.700	82.	Study about preparing image carriers through electronic scanning.
6.	6.600	22.	Learn about production variables (e.g., cost, time, process, materials used, etc.).
7.	6.600	28.	Learn about a signature or dummy.
8.	6.600	67.	Study about generating images with creative photography (continuous tone).
9.	6.600	68.	Learn about assembling images by making a mechanical.

Table 11 (continued)

Rank	Mean	Item	
10.	6.600	71.	Learn about photo-converting images through halftone techniques.
11.	6.600	96.	Know about transferring images through photographic techniques.
12.	6.556	23.	Know aesthetic design principles (e.g., balance, proportion, contrast, rhythm, unity, etc.).
13.	6.556	33.	Know about the capabilities and capacities of reproduction methods and processes.
14.	6.500	20.	Learn about client wants and needs.
15.	6.500	72.	Learn about photo-converting images through process color separating.
16.	6.500	97.	Study about finishing products through assembly.
17.	6.444	91.	Know about transferring images through screen printing.
18.	6.400	29.	Learn about scaling or gridding.
19.	6.400	32.	Study about the advantages and disadvantages of the reproduction methods and processes.
20.	6.400	54.	Learn about characteristics of materials, processes, and/or equipment.
21.	6.400	55.	Study by experimenting with materials, processes, and/or equipment.
22.	6.400	64.	Study about generating images with photographic techniques.
23.	6.400	73.	Learn about photo-converting images through facsimile scanning.

Table 11 (continued)

Rank	Mean	Item	
24.	6.300	26.	Study perceptual principles (e.g., figure/ground relationship, typography, color, density, etc.).
25.	6.300	98.	Study about finishing products through binding.
26.	6.200	69.	Learn about assembling images by imposing.
27.	6.200	83.	Study about preparing image carriers through electrostatic processes.
28.	6.200	99.	Study about finishing products through sizing and pre-assembly (e.g., scoring, folding, perforating, etc.).
29.	6.100	31.	Know about copyfitting procedures.
30.	6.100	86.	Study about preparing image carriers through mechanical techniques (direct image, etc.).
31.	6.100	90.	Know about transferring images through planography.
32.	6.000	36.	Learn about scheduling for product production.
33.	6.000	49.	Learn about inspecting procedures by proofing relief forms, proofing photographically, color keying, etc.
34.	6.000	66.	Study about generating images with illustration techniques.
35.	5.900	14.	Consider the future role of the computer and CRT for communicating printed information.
36.	5.900	94.	Know about transferring images through light absorbency techniques.

Table 11 (continued)

Rank	Mean	Item	
37.	5.900	100.	Study about finishing products through special processes (e.g., die-cutting, embossing, gumming, etc.).
38.	5.800	8.	Study where automation may provide economical efficiency in the graphic communication industry.
39.	5.800	11.	Consider the role of the electrostatic technique (e.g., xerography) in the future of the graphic communication industry.
40.	5.800	16.	Know the classifications by printed products within the graphic communication industries and the type of work done by each division.
41.	5.800	25.	Know about communication theory: source, encode, transmit, receive, decode, feedback, and interference.
42.	5.800	53.	Know how to retrieve information about materials, processes, and/or equipment.
43.	5.800	56.	Know about scarce resources or how to conserve existing resources.
44.	5.700	6.	Study the advantages and disadvantages of the printed message as a way of communicating in the communication and information business.
45.	5.700	34.	Reflect upon methods of reproduction best suited for product based on nature of the product.
46.	5.700	35.	Study estimating procedure.
47.	5.700	48.	Study about production coordination.
48.	5.700	57.	Reflect upon alternative materials for production.

Table 11 (continued)

Rank	Mean	Item	
49.	5.700	85.	Study about preparing image carriers through photopolymers.
50.	5.600	2.	Learn about potential change in the production technology of the graphic communication industry.
51.	5.600	15.	Learn how market analysis is used to determine the needs for various graphic communication products.
52.	5.600	47.	Study about production supervision.
53.	5.600	76.	Learn about photo-converting images through photostabilization.
54.	5.500	7.	Consider alternatives to the printed message, and reflect on the ramifications of a city without a daily newspaper.
55.	5.500	9.	Consider the potential storage mechanisms for printed and non-printed information.
56.	5.500	10.	Know about potential retrieval mechanisms for printed and non-printed information.
57.	5.500	12.	Reflect on how the industry might better process large quantities of information.
58.	5.500	46.	Learn about storing materials based on the qualities of those materials.
59.	5.500	89.	Know about transferring images through intaglio.
60.	5.500	93.	Know about transferring images through electrostatic processes.
61.	5.500	95.	Know about transferring images through heat absorbency techniques.

Table 11 (continued)

Rank	Mean	Item	
62.	5.400	13.	Learn where efficient systems are used with inefficient systems in the processing of information in the graphic communication industry.
63.	5.400	21.	Reflect upon audience variables (e.g., social, cultural, educational level, language, economic level, age, etc.).
64.	5.400	24.	Study classifications of symbols (e.g., images, language related symbols, image related symbols, arbitrarily related symbols, concept related symbols, etc.).
65.	5.400	39.	Know about determining worker functions.
66.	5.400	41.	Learn about determining worker conditions.
67.	5.400	43.	Know about procuring procedures.
68.	5.400	45.	Study routing procedures for production.
69.	5.400	84.	Study about preparing image carriers through heat transfer.
70.	5.300	19.	Know about the influence of the economic conditions on the graphic communication industry (e.g., inflation, recession, new equipment purchases, etc.).
71.	5.300	38.	Know about analyzing work tasks.
72.	5.300	42.	Study requisitioning procedures.
73.	5.300	75.	Learn about photo-converting images through xerography.
74.	5.300	101.	Study about finishing products through packaging.

Table 11 (continued)

Rank	Mean	Item	
75.	5.200	5.	Consider new potential system areas based on existing systems.
76.	5.200	40.	Learn about establishing worker roles.
77.	5.200	44.	Study about subcontracting procedure.
78.	5.200	74.	Learn about photo-converting images through thermography.
79.	5.111	62.	Study about generating images with preprinted and clip art techniques.
80.	5.100	3.	Learn about future trends based on the past nature of the graphic communication industry.
81.	5.100	18.	Study the influence of governmental regulations on the graphic communication industry (e.g., inter- and intra-state regulations, copywriting, etc.).
82.	5.000	52.	Learn about compiling records for controlling production.
83.	5.000	106.	Study working conditions within the graphic communication industry.
84.	4.900	102.	Study about distributing products by storing (e.g., protecting, labeling, inventorying).
85.	4.900	107.	Consider what vertical job mobility exists within the graphic communication industry.
86.	4.800	104.	Study hiring practices of the graphic communication industry.
87.	4.700	4.	Consider broad changes that may occur in the graphic communication industry, excluding new materials and equipment.

Table 11 (continued)

Rank	Mean	Item	
88.	4.700	50.	Know about inventorying procedures.
89.	4.700	51.	Know how production is monitored through timekeeping.
90.	4.500	1.	Forecast the future of the graphic communication industry by prognosticating the nature of the printed message in the year 2000.
91.	4.500	103.	Study about distributing by shipping.
92.	4.400	37.	Study how to acquire licenses, permits, copyrights, etc.
93.	4.400	63.	Study about generating images with strike-on techniques.
94.	4.400	105.	Study training methods used to prepare personnel for the graphic communication industry.
95.	4.400	108.	Reflect upon procedures which are used for retiring personnel and typical benefits accrued.
96.	4.300	17.	Study the effect of the social environment on the graphic communication industry (e.g., declining birth rate).
97.	4.200	81.	Study about preparing image carriers through electroplating.
98.	4.100	78.	Study about preparing image carriers through photoengraving.
99.	4.100	87.	Study about preparing image carriers through stencils.
100.	3.800	80.	Study about preparing image carriers through molding.

Table 11 (continued)

Rank	Mean	Item	
101.	3.600	79.	Study about preparing image carriers through engraving.
102.	3.600	88.	Know about transferring images through relief.
103.	3.500	92.	Know about transferring images through office duplicator (e.g., mimeography, spirit, gelatin).
104.	3.400	77.	Study about preparing image carriers through lock-up techniques.
105.	2.800	58.	Study about generating images with foundry type.
106.	2.800	61.	Study about generating images with conversion processes for hot composition.
107.	2.500	60.	Study about generating images with automatic machine casting units.
108.	2.300	59.	Study about generating images with manually operated machine casting units.

Note. Grand mean response value = 5.472

Comparative Rank-Order of Individual Items by Industry Representatives and Educators

In Table 12 a comparative rank-ordering of the 108 individual items as perceived by graphic communications industry representatives and graphic communications

educators is presented. The letter I represents industry personnel and the letter E represents educators. The rank-ordering, comparing the perceptions of the two populations, was based on the mean response value for each item as calculated from the responses received from the 93 industry representatives and the 10 educators who returned the instrument. Items having the same mean response value, by individual population, were listed in the numerical order in which they appeared in the instrument.

Table 12

Comparative Rank-Order of Individual Items by Industry Representatives and Educators

Rank By I	E	Item	
1.	14.	20.	Learn about client wants and needs.
2.	6.	22.	Learn about production variables, (e.g., cost,time, process, materials used, etc).
3.	2.	30.	Study positioning of elements, (e.g., registration, bleeding, cropping, over-printing, reverse-printing, key lining, etc).
4.	3.	65.	Study about generating images with electronic techniques.
5.	35.	14.	Consider the future role of the computer and CRT for communicating printed information.

Table 12 (continued)

Rank By I	E	Item	
6.	32.	36.	Learn about scheduling for product production.
7.	15.	72.	Learn about photo-converting images through process color separating.
8.	13.	33.	Know about the capabilities and capacities of reproduction methods and processes.
9.	45.	34.	Reflect upon methods of reproduction best suited for product based on nature of the product.
10.	19.	32.	Study about the advantages and disadvantages of the reproduction methods and processes.
11.	50.	2.	Learn about potential change in the production technology of the graphic communication industry.
12.	46.	35.	Study estimating procedure.
13.	33.	49.	Learn about inspecting procedures by proofing relief forms, proofing photographically, color keying, etc.
14.	10.	71.	Learn about photo-converting images through halftone techniques.
15.	5.	82.	Study about preparing image carriers through electronic scanning.
16.	7.	28.	Learn about a signature or dummy.
17.	94.	105.	Study training methods used to prepare personnel for the graphic communication industry.
18.	9.	68.	Learn about assembling images by making a mechanical.

Table 12 (continued)

Rank By I	E	Item	
19.	47.	48.	Study about production coordination.
20.	4.	70.	Learn about photo-converting images through line negative techniques.
21.	29.	31.	Know about copyfitting procedures.
22.	38.	8.	Study where automation may provide economical efficiency in the graphic communication industry.
23.	52.	47.	Study about production supervision.
24.	25.	98.	Study about finishing products through binding.
25.	51.	15.	Learn how market analysis is used to determine the needs for various graphic communication products.
26.	12.	23.	Know aesthetic design principles (e.g., balance, proportion, contrast, rhythm, unity, etc).
27.	28.	99.	Study about finishing products through sizing and pre-assembly (e.g., scoring, folding, perforating, etc.).
28.	18.	29.	Learn about scaling or gridding.
29.	26.	69.	Learn about assembling images by imposing.
30.	1.	27.	Know about design process (e.g., thumbnail sketch, rough layout, comprehensive layout).
31.	11.	96.	Know about transferring images through photographic techniques.

Table 12 (continued)

Rank By I	E	Item	
32.	37.	100.	Study about finishing products through special processes (e.g., die-cutting, embossing, gumming, etc.).
33.	70.	19.	Know about the influence of the economic conditions on the graphic communication industry (e.g., inflation, recession, new equipment purchases, etc).
34.	22.	64.	Study about generating images with photographic techniques.
35.	23.	73.	Learn about photo-converting images through facsimile scanning.
36.	16.	97.	Study about finishing products through assembly.
37.	82.	52.	Learn about compiling records for controlling production.
38.	81.	18.	Study the influence of governmental regulations on the graphic communication industry (e.g., inter- and intra-state regulations, copywriting, etc).
39.	8.	67.	Study about generating images with creative photography (continuous tone).
40.	40.	16.	Know the classifications by printed products within the graphic communication industries and the type of work done by each division.
41.	71.	38.	Know about analyzing work tasks.
42.	89.	51.	Know how production is monitored through timekeeping.

Table 12 (continued)

Rank By I	E	Item	
43.	34.	66.	Study about generating images with illustration techniques.
44.	24.	26.	Study perceptual principles (e.g., figure/ground relationship, typography, color, density, etc).
45.	20.	54.	Learn about characteristics of materials, processes, and/or equipment.
46.	87.	4.	Consider broad changes that may occur in the graphic communication industry, excluding new materials and equipment.
47.	21.	55.	Study by experimenting with materials, processes, and/or equipment.
48.	75.	5.	Consider new potential system areas based on existing systems.
49.	57.	12.	Reflect on how the industry might better process large quantities of information.
50.	42.	53.	Know how to retrieve information about materials, processes, and/or equipment.
51.	65.	39.	Know about determining worker functions.
52.	86.	104.	Study hiring practices of the graphic communication industry.
53.	68.	45.	Study routing procedures for production.
54.	76.	40.	Learn about establishing worker roles.
55.	83.	106.	Study working conditions within the graphic communication industry.

Table 12 (continued)

Rank I	By E	Item	
56.	56.	10.	Know about potential retrieval mechanisms for printed and non-printed information.
57.	48.	57.	Reflect upon alternative materials for production.
58.	66.	41.	Learn about determining worker conditions.
59.	55.	9.	Consider the potential storage mechanisms for printed and non-printed information.
60.	30.	86.	Study about preparing image carriers through mechanical techniques (direct image, etc.).
61.	44.	6.	Study the advantages and disadvantages of the printed message as a way of communicating in the communication and information business.
62.	85.	107.	Consider what vertical job mobility exists within the graphic communication industry.
63.	80.	3.	Learn about future trends based on the past nature of the graphic communication industry.
64.	39.	11.	Consider the role of the electrostatic technique (e.g., xerography) in the future of the graphic communication industry.
65.	74.	101.	Study about finishing products through packaging.

Table 12 (continued)

Rank By I	E	Item	
66.	90.	1.	Forecast the future of the graphic communication industry by prognosticating the nature of the printed message in the year 2000.
67.	88.	50.	Know about inventorying procedures.
68.	43.	56.	Know about scarce resources or how to conserve existing resources.
69.	27.	83.	Study about preparing image carriers through electrostatic processes.
70.	62.	13.	Learn where efficient systems are used with inefficient systems in the processing of information in the graphic communication industry.
71.	84.	102.	Study about distributing products by storing (e.g., protecting, labeling, inventorying).
72.	63.	21.	Reflect upon audience variables, (e.g., social, cultural, educational level, language, economic level, age, etc).
73.	53.	76.	Learn about photo-converting images through photostabilization.
74.	49.	85.	Study about preparing image carriers through photopolymers.
75.	58.	46.	Learn about storing materials based on the qualities of those materials.
76.	17.	91.	Know about transferring images through screen printing.
77.	78.	74.	Learn about photo-converting images through thermography.

Table 12 (continued)

Rank I	Rank E	Item	
78.	41.	25.	Know about communication theory: source, encode, transmit, receive, decode, feedback, and interference.
79.	73.	75.	Learn about photo-converting images through xerography.
80.	67.	43.	Know about procuring procedures.
81.	77.	44.	Study about subcontracting procedure.
82.	64.	24.	Study classifications of symbols (e.g., images, language related symbols, image related symbols, arbitrarily related symbols, concept related symbols, etc).
83.	72.	42.	Study requisitioning procedures.
84.	36.	94.	Know about transferring images through light absorbency techniques.
85.	95.	108.	Reflect upon procedures which are used for retiring personnel and typical benefits accrued.
86.	91.	103.	Study about distributing by shipping.
87.	59.	89.	Know about transferring images through intaglio.
88.	69.	84.	Study about preparing image carriers through heat transfer.
89.	96.	17.	Study the effect of the social environment on the graphic communication industry (e.g., declining birth rate).
90.	31.	90.	Know about transferring images through planography.

Table 12 (continued)

Rank By I	E	Item	
91.	54.	7.	Consider alternatives to the printed message, and reflect on the ramifications of a city without a daily newspaper.
92.	79.	62.	Study about generating images with preprinted and clip art techniques.
93.	60.	93.	Know about transferring images through electrostatic processes.
94.	92.	37.	Study how to acquire licenses, permits, copyrights, etc.
95.	61.	95.	Know about transferring images through heat absorbency techniques.
96.	98.	78.	Study about preparing image carriers through photoengraving.
97.	104.	77.	Study about preparing image carriers through lock-up techniques.
98.	102.	88.	Know about transferring images through relief.
99.	101.	79.	Study about preparing image carriers through engraving.
100.	97.	81.	Study about preparing image carriers through electroplating.
101.	93.	63.	Study about generating images with strike-on techniques.
102.	100.	80.	Study about preparing image carriers through molding.
103.	103.	92.	Know about transferring images through office duplicator (e.g., mimeography, spirit, gelatin).

Table 12 (continued)

Rank By I	E	Item	
104.	99.	87.	Study about preparing image carriers through stencils.
105.	107.	60.	Study about generating images with automatic machine casting units.
106.	105.	58.	Study about generating images with foundry type.
107.	108.	59.	Study about generating images with manually operated machine casting units.
108.	106.	61.	Study about generating images with conversion processes for hot composition.

Note. Grand mean response value based on educators responses equaled 5.472.

Grand mean response value based on industry representatives responses equaled 4.464.

Findings

Data were collected and presented based upon the 103 (45.58%) usable survey responses, 93 responses from the 208 industry representatives surveyed and 10 responses from the 18 educators surveyed. In consideration of that presentation and in regard to subsequent data analyses, the following findings are reported:

1. Critical (ratio) t-values, indicating a significant mean value difference, were found to exist between the industry representatives and educators concerning their perceptions on all nine of the pooled variable groups concerning competencies.

2. Critical (ratio) t-values, indicating a significant mean value difference, were found to exist between the industry representatives and educators concerning their perceptions on 62 of the 108 individual competency items that comprised the nine groups.

3. The mean value ratings of individual items based on educators perceptions were higher than the mean value ratings of those same items based on industry representatives perceptions in 105 of 108 individual item cases.

4. There was no general agreement between the perceptions of the two populations in regard to the rank-ordering of the 108 individual competency items.

5. It appears, based upon the mean response value of individual items as perceived by industry representatives, that most competency items in the areas of image generation and assembly, photo-conversion, image carriers, and image transfer are of lower importance as they are in the third or fourth quartile of the rank-ordering by industry representatives. However, items in these areas which are related to electronic techniques and photographic

techniques including color separation are of higher importance as they are in the first or second quartile of the rank-ordering by industry representatives.

6. It appears, based upon the mean response value of individual items as perceived by industry representatives, that most competency items in the areas of design, finishing and binding, and management are of higher importance as they are in the first or second quartile of the rank-ordering by industry representatives.

7. It appears, based upon the mean response value of individual items as perceived by industry representatives, that most competency items in the areas of basic awareness and future issues are of lower importance as they are in the third or fourth quartile of the rank-ordering by industry representatives. However, items in these areas which are related to electronic techniques (e.g., computers) are of higher importance as they are in the first or second quartile of the rank-ordering by industry representatives.

8. It was stated in the null hypotheses made in regard to this study that there would be no significant mean value difference between the two populations perceptions. The null hypotheses were rejected based upon the findings.

Summary

Of the total 226 surveys mailed to the two populations, 107 (47.35%) were returned. Industry representatives returned 96 (46.15%) of 208 surveys and educators returned 11 (61.11%) of 18 surveys. This represented a combined response rate of 47.35%. However, two of the 96 industry representatives responded after the established cut-off date for accepting responses and two of the remaining 105 responses, one from an educator and one from an industry representative, were returned without any of the survey items being answered. The 103 usable responses remaining, 10 from educators and 93 from industry representatives, represented a combined response rate of 45.58%.

The collected numerical data from the 103 survey instruments were analyzed using a t-test for independent means (two-tailed) at a confidence interval of 95% (0.05 level of significance) to determine if a significant mean value difference existed between the two populations. The presentation of statistical data in regard to the nine pooled variable groups was made in table format. Rank-order tables were constructed based upon the mean response value of the items as perceived by each population and were presented in the chapter.

Eight findings were reported based upon the data analyses. It was found that a significant mean value difference exists between the industry representatives and educators concerning their perceptions concerning competencies on all nine of the pooled variable groups. Significant mean value differences were also found to exist between the industry representatives and educators concerning their perceptions on 62 of the 108 individual competency items that made up the nine pooled variable groups. The mean value ratings of individual items based on educators perceptions were higher than the mean value ratings of those same items based on industry personnel perceptions in 105 of 108 individual item cases. It was found that there was no general agreement in the perceptions of the two populations in regard to the rank-ordering of the 108 competency items.

Based upon the mean response value of individual items as perceived by industry representatives, it appears that most competency items in the areas of image generation and assembly, image carriers, photo-conversion, and image transfer are of lower importance. However, those items in these groups which are related to electronic techniques and photographic techniques including color separation are of higher importance. It also appears, based upon the mean response value of individual items as perceived by industry representatives, that most competency items in the areas of

design, finishing and binding, and management are of higher importance, while most competency items in the areas of basic awareness and future issues are of lower importance. Again, the exceptions are those items which are related to electronic techniques (e.g., computers) and they are of higher importance.

It was stated in the null hypotheses that there would be no significant mean value difference between the two populations perceptions. The null hypotheses were rejected based upon the findings.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The basis of any study is to identify a problem, collect data, report the data, analyze the data, draw conclusions from the findings, and make recommendations based on the conclusions (Clover & Balsley, 1984). The contents of this chapter are presented under the following headings: (a) Summary of the Study, (b) Conclusions, and (c) Recommendations.

Summary of the Study

The problem of this study was to identify and validate a list of competencies that may be used for curriculum development that meets the needs of the contemporary graphic communications industry. The purpose of this study was to provide the graphic communications educator with a comprehensive, prioritized, and logically clustered list of entry-level competencies required of baccalaureate degree graduates from graphic communications programs as perceived by representatives from industry and educators.

The survey instrument used for this study was based upon part three of the instrument developed and used by Dr. J. R. Karsnitz in a national survey and is based on a seven point graphic rating scale on which the 226 persons receiving the instrument were asked to respond to 108

individual items. The 108 items were divided into nine pooled variable groups for statistical analyses. The number of items within each group ranged from a high of 30 to a low of 5. Item groups represented a competency area within the graphic communications industry. The pooled variable groups were presented and statistically analyzed under the following headings: (a) Future Issues, (b) Basic Awareness Issues, (c) Managerial Function Issues, (d) Design Issues, (e) Image Generation and Assembly Issues, (f) Photo-Conversion Issues, (g) Image Carrier Issues, (h) Image Transfer Issues, and (i) Finishing and Binding Issues.

The following hypotheses were made in regard to this study based upon the fact that supportive research data was found during the literature review: (H_1) Competencies as perceived by representatives from the graphic communications industry and educators from graphic communications programs will show a significant difference in the mean value rating as measured by the data collected from the survey instrument and (H_{01}) There will be no significant difference in the mean value rating of competencies as perceived by representatives from the graphic communications industry and educators from graphic communications programs as measured by the data collected from the survey instrument. (H_2) Competencies as perceived by representatives from the graphic communications industry

will show a significant difference in the mean value rating from the competencies as perceived and currently rated as being taught by graphic communications educators as measured by the data collected from the survey instrument and (H_{02}) There will be no significant difference in the mean value rating of competencies as perceived by representatives from the graphic communications industry and competencies as perceived and currently rated as being taught by graphic communications educators as measured by the data collected from the survey instrument.

Of the total 226 surveys mailed to the two populations, 107 (47.35%) were returned. Industry representatives returned 96 (46.15%) of 208 surveys and educators returned 11 (61.11%) of 18 surveys. This represented a combined response rate of 47.35%. However, two of the 96 industry representatives responded after the established cut-off date for accepting responses and two of the remaining 105 responses, one from an educator and one from an industry representative, were returned without any of the survey items being answered. The 103 usable responses remaining, 10 from graphic communications educators and 93 from graphic communications industry representatives, represented a response rate of 45.58%.

The data collected, in regard to the individual items and pooled variable groups, were statistically analyzed using a t-test for independent means (two-tailed) at a 95%

confidence interval (0.05 level of significance) to determine whether a significant mean value difference existed between the two populations. The data were presented in tabular format.

Eight findings were reported based upon the data analyses. It was found that a significant mean value difference exists between the industry representatives and educators concerning their perceptions concerning competencies on all nine of the pooled variable groups. Significant mean value differences were also found to exist between the industry representatives and educators concerning their perceptions on 62 of the 108 individual competency items that made up the nine pooled variable groups. The mean value ratings of individual items based on educators perceptions were higher than the mean value ratings of those same items based on industry personnel perceptions in 105 of 108 individual item cases. It was found that there was no general agreement in the perceptions of the two populations in regard to the rank-ordering of the 108 competency items.

Based upon the mean response value of individual items as perceived by industry representatives, it appears that most competency items in the areas of image generation and assembly, image carriers, photo-conversion, and image transfer are of lower importance. However, those items in these groups which are related to electronic techniques and

photographic techniques including color separation are of higher importance. It also appears, based upon the mean response value of individual items as perceived by industry representatives, that most competency items in the areas of design, finishing and binding, and management are of higher importance, while most competency items in the areas of basic awareness and future issues are of lower importance. Again, the exceptions are those items which are related to electronic techniques (e.g., computers) and they are of higher importance. It was stated in the null hypotheses that there would be no significant mean value difference between the two populations perceptions. The null hypotheses were rejected based upon the findings.

Conclusions

Subject to the stated assumptions and limitations of this study, the following conclusions are presented. They include:

1. There is a significant difference between the perceptions of representatives from the graphic communications industry and educators in regard to competencies required of baccaulaureate degree graduates from graphic communications programs. Therefore, the null hypothesis (H_{01}) was rejected.

2. There is a significant difference between the perceptions of representatives from the graphic

communications industry and educators in regard to competencies that should be currently taught in graphic communications programs. Therefore, the null hypothesis (H_{02}) was rejected.

3. A comprehensive, prioritized, and logically clustered list of competencies that should be taught in graphic communications programs at the college and/or university level, as perceived and suggested by graphic communications industry representatives, were identified. A means of rank-ordering the nine pooled variable groups is provided by using the average mean response value (derived by dividing the summed mean response value of the pooled variable group by the number of individual items within the group) of the groups.

Based upon this value, the rank-ordering of the groups is as follows: (1) Design Issues, (2) Finishing and Binding Issues, (3) Future Issues, (4) Photo-Conversion Issues, (5) Managerial Function Issues, (6) Basic Awareness Issues, (7) Image Transfer Issues, (8) Image Generation and Assembly Issues, and (9) Image Carriers Issues. The average mean response values ranged from a high of 5.132 for design issues to a low of 3.649 for image carrier issues.

There appeared to be three natural breaks within the group rankings. Design issues appeared to stand alone in the group rankings with an average mean of 5.132. Finishing and binding, future, photo-conversion, and

managerial function issues fell into a second grouping with average mean values ranging from 4.889 to 4.721. Somewhat farther back, the basic awareness, image transfer, image generation and assembly, and image carrier issues made up a third grouping. The average mean by group for this cluster ranged from 4.449 to 3.649.

The rank-order of individual items within each group must also be considered by the curriculum designer in order to develop the optimum contemporary curricula. With the exception of basic awareness and finishing and binding issues, each of the other seven groups had individual items in the top 10 of the rank-order listing. Managerial function items were ranked first, second, and sixth. An item from the design issues group was ranked third. Items from the image generation and assembly and future issues groups were ranked fourth and fifth respectively, while a photo-conversion item was seventh. Three items from the image transfer group were ranked eighth, ninth, and tenth.

Recommendations

The following recommendations are based upon the review of related literature, data analyses from this study, and identified conclusions. Given the findings and outcomes of this study, recommendations for further study are warranted and can be utilized to define the curricular needs of college and/or university graphic communications

programs so that competency requirements of the contemporary graphic communications industry may be met.

General Recommendations

General recommendations are made in regard to this study. They include:

1. Since significant differences in priorities exist between industry representatives and educators, designers of curriculum for graphic communications programs at the college and/or university level should consider the priorities of industry if meeting industry's needs is an objective of the curriculum.

2. Graphic communications educators should work closely with the representatives of the graphic communications industry in order to develop a contemporary competency-based curriculum that satisfies the requirements of the industry.

3. Graphic communications educators should evaluate current curricula in order to help students better interpret and simulate the contemporary graphic communications industry.

4. Graphic communications educators should avail themselves of instruction provided by industry concerning the most recent technological developments including materials, processes, and equipment. This may be accomplished through educators becoming involved in

industry supported workshops, seminars, conferences, professional association meetings, and working with industry advisory committees.

5. To meet the needs of the contemporary graphic communications industry, educators should incorporate new industrial materials, processes, and equipment into programs and they should address the industry priority rankings that resulted from this study in regard to curriculum development.

6. Based upon the priorities of industry, graphic communications educators should place less instructional emphasis on competencies relating to the areas of image generation and assembly, photo-conversion, image carriers, and image transfer with the exception of items related to electronic techniques and basic photographic techniques (e.g., line negatives, continuous tone, and color separation).

7. Based upon the priorities of industry, graphic communications educators should place more instructional emphasis on competencies relating to electronic techniques and technologies (e.g., desktop publishing, electronic scanning, and other computer related activities).

8. Based upon the priorities of industry, graphic communications educators should place more instructional emphasis on design, finishing and binding, and managerial functions including meeting the needs of the customer.

Recommendations for Further Study

Recommendations for further study are made in regard to this study. They include:

1. A similar study should be conducted in other states in order to support the results of this research.

2. A similar study should be conducted that would treat the data to more rigorous statistical analyses (i.e., chi-square analysis) in order to rate the importance of the items in regard to curriculum development.

3. A study should be done to find how industry representatives and educators may best work together to provide students with a viable up-to-date competency-based curriculum.

4. A study should be done that further defines the competencies (i.e., task analysis) required of entry-level employees in terms of job-specific tasks within the contemporary graphic communications industry.

5. A study should be done that focuses on the specific competency requirements of individual segments or divisions of the graphic communications industry (e.g., pre-press, press, post-press by printed product or by S.I.C. code classifications).

6. A study should be done that focuses on the specific competency requirements of particular geographic markets and the localized needs within that market.

REFERENCES

Anderson, A. L. (1983). Graphic communications instruction for industrial arts teacher education and industrial technology degree programs. Dissertation Abstracts International, 44, 690A. (University Microfilm No. 83-16, 136)

Blair, R. N. (Ed.). (1983). The lithographers manual (7th ed.). Pittsburgh: Graphic Arts Technical Foundation.

Bowling, R. L. (1984). A needs assessment of the Knoxville labor market to determine a post secondary graphic-arts program for the state technical institute at Knoxville, Tennessee. Dissertation Abstracts International, 45, 1729A. (University Microfilm No. 84-21, 368)

Brown, W. C. (1983). Validation of technical competencies for the manufacturing engineering technology baccalaureate degree program at Western Carolina University. Dissertation Abstracts International, 45, 3083A. (University Microfilm No. 84-28, 981)

Clover, V. T., & Balsley, H. L. (1984). Business research methods (3rd ed.). Columbus, OH: Grid Publishing.

Connor, S. G. (1986). Industrial technology and industry: A derivation of subject matter from industry with implications for curricular change. Dissertation Abstracts International, 47, 1632A. (University Microfilm No. 86-17, 103)

Cox, R. L. (1970). A study to determine the extent to which graphic arts education is filling the needs of the graphic arts industry. Dissertation Abstracts International, 31, 1113A-1114A. (University Microfilm No. 70-17, 201)

Dennis, E. A. (Ed.). (1988-89). Industrial Teacher Education Directory, CTTE and NAITTE, University of Northern Iowa, Department of Industrial Technology, Cedar Falls, IA.

Elliott, G. A., Jr. (1979). The development of a model for evaluation of graphic arts programs in four-year colleges and universities. Dissertation Abstracts International, 40, 6086A. (University Microfilm No. 80-11, 946)

Fecik, J. T. (1970). The identification and classification of graphic communication technology. Dissertation Abstracts International, 31, 5165A. (University Microfilm No. 71-10, 214)

Frey, J. R. (Ed.). (1989, January). Membership list of the Printing Industries of the Midlands. (Available from Printing Industries of the Midlands, 11009 Aurora Avenue, Des Moines, IA 50322).

Gillespie, P. R. (1983, August). Graphic arts education for the '80's and '90's. Paper presented at the meeting of the International Graphic Arts Educational Association, Clemson, SC.

Glogovsky, R. J. (1970). A comparison of graphic arts processes practiced by contemporary industry with those taught in industrial arts teacher education. Dissertation Abstracts International, 31, 2146A. (University Microfilm No. 70-23, 207)

Good, C. V. (Ed.) (1973). Dictionary of education (3rd ed.). New York: McGraw-Hill Book Company.

Karsnitz, J. R. (1976). A national survey to determine the status and relationship of programmatic offerings in graphic arts teacher education to a validated body of knowledge. Dissertation Abstracts International, 37, 7000A-7001A. (University Microfilm No. 77-10, 547)

King, J. W. (1984). Post secondary institutions' role in meeting the training needs of high technology industries. Dissertation Abstracts International, 45, 2738A. (University Microfilm No. 84-27, 858)

Mager, R. F., & Beach, K. M. (1967). Developing vocational instruction. Belmont, CA: David S. Lake Publishers.

McKeachie, W. J. (1986). Teaching tips: A guidebook for the beginning college teacher (8th ed.). Lexington, MA: D.C. Heath and Company.

Meline, C. W. (1965). A critical analysis of the educational objective to develop interest in industry and its relationship to the graphic arts (research study no. 1). Dissertation Abstracts International, 26, 5299-5300. (University Microfilm No. 65-14, 824)

Miller, W. R., & Rose, H. C. (1975). Instructors and their jobs (3rd ed.). Homewood, IL: American Technical Publishers, Inc.

Mish, F. C. (Ed.). (1987). Webster's ninth new collegiate dictionary. Springfield, MA: Merriam-Webster.

Rieth, C. E. (1966). Competencies needed by college-level printing technology students for effective placement in supervisory and management positions in Indiana printing industries. Dissertation Abstracts International, 27, 3375A-3376A. (University Microfilm No. 67-40, 30)

Rogers, C. R. (1983). Freedom to learn. Columbus, OH: Charles E. Merrill Publishing Company.

Salvagin, C. E. (1974). Photographic technology: Background, present status, and educational implications for graphic communications at the secondary and postsecondary levels. Dissertation Abstracts International, 36, 166A. (University Microfilm No. 75-14, 470)

Shavelson, R. J. (1988). Statistical reasoning for the behavioral sciences (2nd ed.). Needham Heights, MA: Allyn and Bacon.

Simich, J. (1987, July). Training - a growing need. Graphic Network, 1, (30), p. 41.

State of Iowa Department of Public Instruction. (1982). Iowa industrial arts handbook for introductory level graphic communications (2nd. ed.). Des Moines, IA: Author.

APPENDIX A

SURVEY INSTRUMENT

GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION
GRAPHIC COMMUNICATION

INDUSTRY and EDUCATION

SURVEY

Eldon B. Swanson--Principal Investigator
Department of Industrial Technology
University of Northern Iowa
Cedar Falls, Iowa 50614-0178

№ 00347
CODE

DIRECTIONS: After reading each item carefully, circle the number on the scale which best indicates the degree of emphasis you believe should be placed on the item as it relates to graphic communication programs at the college and/or university level. A seven (7) point scale is used for denoting degree of emphasis, with a "1" indicating low emphasis to a "7" indicating high emphasis.

	Degree of Emphasis						
	Low						High

Example:

Comprehensive study of relief printing should be undertaken by students in contemporary graphic communication programs at the college and/or university level.	1	(2)	3	4	5	6	7

1.	Forecast the future of the graphic communication industry prognosticating the nature of the printed message in the year 2000.	1	2	3	4	5	6	7
2.	Learn about potential change in the production technology of the graphic communication industry.	1	2	3	4	5	6	7
3.	Learn about future trends based on the past nature of the graphic communication industry.	1	2	3	4	5	6	7
4.	Consider broad changes that may occur in the graphic communication industry, excluding new materials and equipment.	1	2	3	4	5	6	7
5.	Consider new potential system areas based on existing systems.	1	2	3	4	5	6	7
6.	Study the advantages and disadvantages of the printed message as a way of communicating in the communication/information business.	1	2	3	4	5	6	7
7.	Consider alternatives to the printed message, and reflect on the ramifications of a city without a daily newspaper.	1	2	3	4	5	6	7
8.	Study where automation may provide economical efficiency in the graphic communication industry.	1	2	3	4	5	6	7
9.	Consider the potential storage mechanisms for printed and non-printed information.	1	2	3	4	5	6	7
10.	Know about potential retrieval mechanisms for printed and non-printed information.	1	2	3	4	5	6	7
11.	Consider the role of the electrostatic technique (e.g., xerography) in the future of the graphic communication industry.	1	2	3	4	5	6	7
12.	Reflect on how the industry might better process large quantities of information.	1	2	3	4	5	6	7
13.	Learn where efficient systems are used with inefficient systems in the processing of information in the graphic communication industry.	1	2	3	4	5	6	7
14.	Consider the future role of the computer and CRT for communicating printed information.	1	2	3	4	5	6	7
15.	Learn how market analysis is used to determine the needs for various graphic communication products.	1	2	3	4	5	6	7
16.	Know the classification by printed products within the graphic communication industries and the type of work done by each division.	1	2	3	4	5	6	7
17.	Study the effect of the social environment on the graphic communication industry (e.g., declining birth rate).	1	2	3	4	5	6	7
18.	Study the influence of governmental regulations on the graphic communication industry (e.g., inter- and intra- state regulations, copywriting, etc.).	1	2	3	4	5	6	7
19.	Know about the influence of the economic conditions on the graphic communication industry (e.g., inflation, recession, new equipment purchases, etc.).	1	2	3	4	5	6	7
20.	Learn about client wants and needs.	1	2	3	4	5	6	7
21.	Reflect upon audience variables (e.g., social, cultural, educational level, language, economic level, age, etc.).	1	2	3	4	5	6	7
22.	Learn about production variables (e.g., cost, time process, materials used, etc.).	1	2	3	4	5	6	7
23.	Know aesthetic design principles (e.g., balance, proportion, contrast, rhythm, unity, etc.).	1	2	3	4	5	6	7
24.	Study classifications of symbols (e.g., images, language related symbols, arbitrarily related symbols, concept related symbols, etc.).	1	2	3	4	5	6	7

		Degree of Emphasis						
		Low						High
25.	Know about communication theory: source, encode, transmit, receive, decode, feedback, and interference	1	2	3	4	5	6	7
26.	Study perceptual principles (e.g., figure/ground relationship, typography, color, density, etc.)	1	2	3	4	5	6	7
27.	Know about design process (e.g., thumbnail sketch, rough layout, comprehensive layout)	1	2	3	4	5	6	7
28.	Learn about a signature or dummy	1	2	3	4	5	6	7
29.	Learn about scaling or gridding	1	2	3	4	5	6	7
30.	Study positioning of elements (e.g., registration, bleeding, cropping, over-printing, reverse-printing, key lining, etc.)	1	2	3	4	5	6	7
31.	Know about copyfitting procedures	1	2	3	4	5	6	7
32.	Study about the advantages and disadvantages of the reproduction methods and processes	1	2	3	4	5	6	7
33.	Know about the capabilities and capacities of reproduction methods and processes	1	2	3	4	5	6	7
34.	Reflect upon methods of reproduction best suited for product based on nature of the product	1	2	3	4	5	6	7
35.	Study estimating procedures	1	2	3	4	5	6	7
36.	Learn about scheduling for product production	1	2	3	4	5	6	7
37.	Study how to acquire licenses, permits, copyrights, etc.	1	2	3	4	5	6	7
38.	Know about analyzing work tasks	1	2	3	4	5	6	7
39.	Know about determining worker functions	1	2	3	4	5	6	7
40.	Learn about establishing worker roles	1	2	3	4	5	6	7
41.	Learn about determining worker conditions	1	2	3	4	5	6	7
42.	Study requisitioning procedures	1	2	3	4	5	6	7
43.	Know about procuring procedures	1	2	3	4	5	6	7
44.	Study about subcontracting procedures	1	2	3	4	5	6	7
45.	Study routing procedures for production	1	2	3	4	5	6	7
46.	Learn about storing materials based on the qualities of those materials	1	2	3	4	5	6	7
47.	Study about production supervision	1	2	3	4	5	6	7
48.	Study about production coordination	1	2	3	4	5	6	7
49.	Learn about inspecting procedures by proofing relief forms, proofing photographically, color keying, etc.	1	2	3	4	5	6	7
50.	Know about inventorying procedures	1	2	3	4	5	6	7
51.	Know how production is monitored through timekeeping	1	2	3	4	5	6	7
52.	Learn about compiling records for controlling production	1	2	3	4	5	6	7
53.	Know how to retrieve information about materials, processes, and/or equipment	1	2	3	4	5	6	7
54.	Learn about characteristics of materials, processes, and/or equipment	1	2	3	4	5	6	7
55.	Study by experimenting with materials, processes, and/or equipment	1	2	3	4	5	6	7
56.	Know about scarce resources or how to conserve existing resources	1	2	3	4	5	6	7
57.	Reflect upon alternative materials for production	1	2	3	4	5	6	7
58.	Study about generating images with foundry type	1	2	3	4	5	6	7
59.	Study about generating images with manually operated machine casting units	1	2	3	4	5	6	7
60.	Study about generating images with automatic machine casting units	1	2	3	4	5	6	7
61.	Study about generating images with conversion processes for hot composition	1	2	3	4	5	6	7
62.	Study about generating images using preprinted and clip art techniques	1	2	3	4	5	6	7
63.	Study about generating images with strike-on techniques	1	2	3	4	5	6	7
64.	Study about generating images with photographic techniques	1	2	3	4	5	6	7
65.	Study about generating images with electronic techniques	1	2	3	4	5	6	7

		Degree of Emphasis						
		Low						High
66.	Study about generating images with illustration techniques	1	2	3	4	5	6	7
67.	Study about generating images with creative photography (continuous tone)	1	2	3	4	5	6	7
68.	Learn about assembling images by making a mechanical	1	2	3	4	5	6	7
69.	Learn about assembling images by imposing	1	2	3	4	5	6	7
70.	Learn about photo-converting images through line negative techniques	1	2	3	4	5	6	7
71.	Learn about photo-converting images through halftone techniques	1	2	3	4	5	6	7
72.	Learn about photo-converting images through process color separation	1	2	3	4	5	6	7
73.	Learn about photo-converting images through fascimile scanning	1	2	3	4	5	6	7
74.	Learn about photo-converting images through thermography	1	2	3	4	5	6	7
75.	Learn about photo-converting images through xerography	1	2	3	4	5	6	7
76.	Learn about photo-converting images through photostabilization	1	2	3	4	5	6	7
77.	Study about preparing image carriers through lock-up techniques	1	2	3	4	5	6	7
78.	Study about preparing image carriers through photoengraving	1	2	3	4	5	6	7
79.	Study about preparing image carriers through engraving	1	2	3	4	5	6	7
80.	Study about preparing image carriers through molding	1	2	3	4	5	6	7
81.	Study about preparing image carriers through electroplating	1	2	3	4	5	6	7
82.	Study about preparing image carriers through electronic scanning	1	2	3	4	5	6	7
83.	Study about preparing image carriers through electrostatic processes	1	2	3	4	5	6	7
84.	Study about preparing image carriers through heat transfer	1	2	3	4	5	6	7
85.	Study about preparing image carriers through photopolymers	1	2	3	4	5	6	7
86.	Study about preparing image carriers through mechanical techniques (direct image, etc.)	1	2	3	4	5	6	7
87.	Study about preparing image carriers through stencils	1	2	3	4	5	6	7
88.	Know about transferring images through relief	1	2	3	4	5	6	7
89.	Know about transferring images through gravure	1	2	3	4	5	6	7
90.	Know about transferring images through planography	1	2	3	4	5	6	7
91.	Know about transferring images through screen printing	1	2	3	4	5	6	7
92.	Know about transferring images through office duplicator (e.g., mimeography, spirit, gelatin)	1	2	3	4	5	6	7
93.	Know about transferring images through electrostatic processes	1	2	3	4	5	6	7
94.	Know about transferring images through light absorbency techniques	1	2	3	4	5	6	7
95.	Know about transferring images through heat absorbency techniques	1	2	3	4	5	6	7
96.	Know about transferring images through photographic techniques	1	2	3	4	5	6	7
97.	Study about finishing products through assembly	1	2	3	4	5	6	7
98.	Study about finishing products through binding	1	2	3	4	5	6	7
99.	Study about finishing products through sizing and pre-assembly (e.g., scoring, folding, perforating, etc.)	1	2	3	4	5	6	7
100.	Study about finishing products through special processes (e.g., die-cutting, embossing, gumming, etc.)	1	2	3	4	5	6	7
101.	Study about finishing products through packaging	1	2	3	4	5	6	7
102.	Study about distributing products by storing (e.g., protecting, labeling, inventorying)	1	2	3	4	5	6	7
103.	Study about distributing by shipping	1	2	3	4	5	6	7
104.	Study hiring practices of the graphic communication industry	1	2	3	4	5	6	7
105.	Study training methods used to prepare personnel for the graphic communication industry	1	2	3	4	5	6	7
106.	Study working conditions within the graphic communication industry	1	2	3	4	5	6	7
107.	Consider what vertical job mobility exists within the graphic communication industry	1	2	3	4	5	6	7
106.	Reflect upon procedures which are used for retiring personnel within the graphic communication industry and typical benefits accrued	1	2	3	4	5	6	7

Now that you have completed the items given in the survey, in your opinion are there other areas that you believe should receive a high degree of emphasis in college and/or university level graphic communication programs? If your answer to this question is yes, would you please assist me by listing those areas that you feel should be addressed. _____

_____

_____

_____

_____

_____

_____

Job Title and/or Area of Major Responsibility _____

_____

_____

_____

If you would like to receive a copy of the results of the survey place a check mark in the box provided. [ ]

Please accept my personal thanks for your cooperation and prompt response in completing the survey and returning it to me. Your continuing interest in the graphic communication profession is much appreciated.

Sincerely,

Eldon B. Swanson

Eldon B. Swanson – Principal Investigator

Department of Industrial Technology
University of Northern Iowa
Cedar Falls, Iowa 50614-0178

1-319-273-2561 or 273-2509

RETURN WITHIN FIVE (5) DAYS OF RECEIPT IN ENVELOPE PROVIDED. THANK YOU.

APPENDIX B

PRESENTATION AND ANALYSES OF DATA ON INDIVIDUAL ITEMS BY POOLED VARIABLE GROUP

Future Issues

The data concerning the individual items from this group are presented in Table B-1 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-1

Future Issues Item Analysis

Item	Type	n	m	sd	t
1.	E	10	4.500	1.581	0.17
	I	92	4.402	1.761	
2.	E	10	5.600	0.843	0.56
	I	93	5.366	1.292	
3.	E	10	5.100	1.287	1.31
	I	93	4.441	1.528	
4.	E	10	4.700	1.567	-0.20
	I	92	4.794	1.355	
5.	E	10	5.200	1.317	1.04
	I	92	4.772	1.223	
14.	E	10	5.900	1.101	0.67
	I	92	5.620	1.265	
55.	E	10	6.400	0.966	3.51*
	I	92	4.794	1.411	
56.	E	10	5.800	1.476	3.15*
	I	93	4.344	1.379	

Note. * significant mean difference at the 0.05 level.

1. Forecast the future of the graphic communication industry by prognosticating the nature of the printed message in the year 2000.

2. Learn about potential change in the production technology of the graphic communication industry.

3. Learn about future trends based on the past nature of the graphic communication industry.

4. Consider broad changes that may occur in the graphic communication industry, excluding new materials and equipment.

5. Consider new potential system areas based on existing systems.

8. Study where automation may provide economical efficiency in the graphic communication industry.

9. Consider the potential storage mechanisms for printed and non-printed information.

10. Know about potential retrieval mechanisms for printed and non-printed information.

14. Consider the future role of the computer and CRT for communicating printed information.

55. Study by experimenting with materials, processes and/or equipment.

56. Know about scarce resources or how to conserve existing resources.

Basic Awareness Issues

The data concerning the individual items from this group are presented in Table B-2 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-2

Basic Awareness Issues Item Analysis

Item	Type	n	m	sd	t
6.	E	10	5.700	1.059	2.39*
	I	92	4.544	1.486	
7.	E	10	5.500	0.843	3.58*
	I	92	3.717	1.536	
12.	E	10	5.500	0.972	1.53
	I	92	4.728	1.556	
13.	E	10	5.400	0.966	2.36*
	I	93	4.301	1.435	
16.	E	10	5.800	1.398	2.00*
	I	93	4.839	1.447	
17.	E	10	4.300	0.823	1.00
	I	93	3.785	1.607	
18.	E	10	5.100	1.370	0.48
	I	93	4.860	1.501	
19.	E	10	5.300	1.337	0.71
	I	93	4.968	1.402	
21.	E	10	5.400	1.776	2.47*
	I	92	4.261	1.341	
25.	E	10	5.800	1.398	3.72*
	I	93	4.075	1.393	

Note. * significant mean difference at the 0.05 level.

6. Study the advantages and disadvantages of the printed message as a way of communicating in the communication and information business.

7. Consider alternatives to the printed message, and reflect on the ramifications of a city without a daily newspaper.

12. Reflect on how the industry might better process large quantities of information.

13. Learn where efficient systems are used with inefficient systems in the processing of information in the graphic communication industry.

16. Know the classifications by printed products within the graphic communication industries and the type of work done by each division.

17. Study the effect of the social environment on the graphic communication industry (e.g., declining birth rate).

18. Study the influence of governmental regulations on the graphic communication industry (e.g., inter- and intra-state regulations, copywriting, etc.).

19. Know about the influence of the economic conditions on the graphic communication industry (e.g., inflation, recession, new equipment purchases, etc.).

21. Reflect upon audience variables (e.g., social, cultural, educational level, language, economic level, age, etc.).

25. Know about communication theory: source, encode, transmit, receive, decode, feedback, and interference.

Managerial Function Issues

The data concerning the individual items from this group are presented in Table B-3 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-3

Managerial Function Issues Item Analysis

Item	Type	n	m	sd	t
15.	E	10	5.600	0.699	1.25
	I	93	5.075	1.304	
20.	E	10	6.500	0.707	1.00
	I	92	6.065	1.358	
22.	E	10	6.600	0.516	2.24*
	I	92	5.815	1.089	
35.	E	10	5.700	1.418	0.86
	I	93	5.323	1.312	
36.	E	10	6.000	0.943	1.09
	I	93	5.527	1.332	
37.	E	10	4.400	1.506	1.66
	I	93	3.656	1.331	
38.	E	10	5.300	0.949	1.02
	I	93	4.839	1.393	
39.	E	10	5.400	0.966	1.70
	I	93	4.688	1.285	
40.	E	10	5.200	1.033	1.26
	I	93	4.645	1.348	
41.	E	10	5.400	1.075	1.89
	I	93	4.581	1.321	
42.	E	10	5.300	1.059	3.14*
	I	93	3.914	1.349	
43.	E	10	5.400	0.843	3.13*
	I	93	4.011	1.371	
44.	E	10	5.200	0.919	2.59*
	I	93	4.011	1.418	
45.	E	10	5.400	1.265	1.62
	I	93	4.656	1.387	

Table B-3 (continued)

Item	Type	n	m	sd	t
46.	E	10	5.500	1.080	2.77*
	I	92	4.228	1.407	
47.	E	10	5.600	1.174	1.15
	I	93	5.108	1.298	
48.	E	10	5.700	1.059	1.08
	I	92	5.250	1.263	
49.	E	10	6.000	0.943	1.58
	I	93	5.323	1.320	
50.	E	10	4.700	1.059	0.65
	I	93	4.387	1.475	
51.	E	10	4.700	0.949	-0.31
	I	93	4.839	1.362	
52.	E	10	5.000	0.816	0.28
	I	93	4.871	1.416	
53.	E	10	5.800	1.033	2.45*
	I	93	4.710	1.364	
54.	E	10	6.400	0.699	3.72*
	I	93	4.796	1.340	
102.	E	10	4.900	0.876	1.28
	I	93	4.301	1.451	
103.	E	10	4.500	1.080	1.23
	I	92	3.859	1.608	
104.	E	10	4.800	1.398	0.24
	I	92	4.685	1.460	
105.	E	10	4.400	1.578	-1.98
	I	93	5.280	1.305	
106.	E	10	5.000	1.054	0.81
	I	92	4.641	1.347	

Table B-3 (continued)

Item	Type	n	m	sd	t
107.	E	10	4.900	0.994	0.90
	I	93	4.495	1.380	
108.	E	10	4.400	0.843	1.09
	I	92	3.870	1.513	

Note. * significant mean difference at the 0.05 level.

15. Learn how market analysis is used to determine the needs for various graphic communication products.

20. Learn about client wants and needs.

22. Learn about production variables (e.g., cost, time, process, materials used, etc.).

35. Study estimating procedure.

36. Learn about scheduling for product production.

37. Study how to acquire licenses, permits, copyrights, etc.

38. Know about analyzing work tasks.

39. Know about determining worker functions.

40. Learn about establishing worker roles.

41. Learn about determining worker conditions.

42. Study requisitioning procedures.

43. Know about procuring procedures.

44. Study about subcontracting procedure.

45. Study routing procedures for production.

46. Learn about storing materials based on the qualities of those materials.

47. Study about production supervision.

48. Study about production coordination.

49. Learn about inspecting procedures by proofing relief forms, proofing photographically, color keying, etc.

50. Know about inventorying procedures.

51. Know how production is monitored through timekeeping.

52. Learn about compiling records for controlling production.

53. Know how to retrieve information about materials, processes, and/or equipment.

54. Learn about characteristics of materials, processes, and/or equipment.

102. Study about distributing products by storing (e.g., protecting, labeling, inventorying).

103. Study about distributing by shipping.

104. Study hiring practices of the graphic communication industry.

105. Study training methods used to prepare personnel for the graphic communication industry.

106. Study working conditions within the graphic communication industry.

107. Consider what vertical job mobility exists within the graphic communication industry.

108. Reflect upon procedures which are used for retiring personnel and typical benefits accrued.

Design Issues

The data concerning the individual items from this group are presented in Table B-4 in the order that each

appeared. The individual items that made up this pooled variable group are found following the table.

Table B-4

Design Issues Item Analysis

Item	Type	n	m	sd	t
23.	E	9	6.556	0.527	3.16*
	I	93	5.054	1.409	
26.	E	10	6.300	0.675	3.62*
	I	93	4.796	1.290	
27.	E	10	6.800	0.422	4.19*
	I	93	5.011	1.339	
28.	E	10	6.600	0.516	3.10*
	I	93	5.280	1.330	
29.	E	10	6.400	0.699	2.94*
	I	92	5.022	1.460	
30.	E	10	6.700	0.483	2.70*
	I	92	5.674	1.187	

Note. * significant mean difference at the 0.05 level.

23. Know aesthetic design principles (e.g., balance, proportion, contrast, rhythm, unity, etc.).

26. Study perceptual principles (e.g., figure/ground relationship, typography, color, density, etc.).

27. Know about design process (e.g., thumbnail sketch, rough layout, comprehensive layout).

28. Learn about a signature or dummy.

29. Learn about scaling or gridding.

30. Study positioning of elements (e.g., registration, bleeding, cropping, over-printing, reverse-printing, key lining, etc.).

Image Generation and Assembly Issues

The data concerning the individual items from this group are presented in Table B-5 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-5

Image Generation Assembly Issues Item Analysis

Item	Type	n	m	sd	t
24.	E	10	5.400	0.843	3.56*
	I	93	3.968	1.238	
31.	E	10	6.100	0.994	2.02*
	I	93	5.172	1.411	
58.	E	10	2.800	1.687	1.27
	I	93	2.226	1.320	
59.	E	10	2.300	1.829	0.21
	I	92	2.207	1.305	
60.	E	10	2.500	1.780	0.34
	I	92	2.348	1.296	
61.	E	10	2.800	1.874	1.43
	I	92	2.196	1.197	
62.	E	9	5.111	1.364	2.96*
	I	92	3.717	1.345	

Table B-5 (continued)

Item	Type	n	m	sd	t
63.	E	10	4.400	1.350	3.03*
	I	92	2.946	1.448	
64.	E	10	6.400	0.699	3.45*
	I	93	4.968	1.289	
65.	E	10	6.700	0.675	2.52*
	I	93	5.667	1.271	
66.	E	10	6.000	0.816	2.79*
	I	93	4.807	1.321	
67.	E	10	6.600	0.516	4.16*
	I	93	4.860	1.307	
68.	E	10	6.600	0.699	3.43*
	I	93	5.226	1.243	
69.	E	10	6.200	0.789	2.85*
	I	93	5.022	1.277	

Note. * significant mean difference at the 0.05 level.

24. Study classifications of symbols (e.g., images, language related symbols, image related symbols, arbitrarily related symbols, concept related symbols, etc.).

31. Know about copyfitting procedures.

58. Study about generating images with foundry type.

59. Study about generating images with manually operated machine casting units.

60. Study about generating images with automatic machine casting units.

61. Study about generating images with conversion processes for hot composition.

62. Study about generating images with preprinted and clip art techniques.

63. Study about generating images with strike-on techniques.

64. Study about generating images with photographic techniques.

65. Study about generating images with electronic techniques.

66. Study about generating images with illustration techniques.

67. Study about generating images with creative photography (continuous tone).

68. Learn about assembling images by making a mechanical.

69. Learn about assembling images by imposing.

Photo-Conversion Issues

The data concerning the individual items from this group are presented in Table B-6 in the order that each appeared. The individual items that made up this pooled variable group are listed below.

70. Learn about photo-converting images through line negative techniques.

71. Learn about photo-converting images through halftone techniques.

72. Learn about photo-converting images through process color separating.

73. Learn about photo-converting images through facsimile scanning.

74. Learn about photo-converting images through thermography.

75. Learn about photo-converting images through xerography.

76. Learn about photo-converting images through photostabilization.

Table B-6

Photo-Conversion Issues Item Analysis

Item	Type	n	m	sd	t
70.	E	10	6.700	0.483	3.44*
	I	93	5.194	1.369	
71.	E	10	6.600	0.516	2.99*
	I	93	5.323	1.336	
72.	E	10	6.500	0.707	2.27*
	I	93	5.516	1.348	
73.	E	10	6.400	0.966	3.08*
	I	93	4.968	1.433	
74.	E	10	5.200	1.229	2.29*
	I	93	4.118	1.436	
75.	E	10	5.300	1.767	2.37*
	I	93	4.075	1.527	
76.	E	9	5.600	1.075	2.93*
	I	92	4.261	1.398	

Note. * significant mean difference at the 0.05 level.

Image Carrier Issues

The data concerning the individual items from this group are presented in Table B-7 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-7

Image Carrier Issues Item Analysis

Item	Type	n	m	sd	t
77.	E	10	3.400	2.171	0.49
	I	89	3.124	1.622	
78.	E	10	4.100	1.912	1.76
	I	93	3.140	1.606	
79.	E	10	3.600	1.838	0.98
	I	93	3.075	1.583	
80.	E	10	3.800	2.044	1.83
	I	92	2.870	1.469	
81.	E	10	4.200	2.201	2.19*
	I	92	3.022	1.548	
82.	E	10	6.700	0.483	3.22*
	I	92	5.283	1.377	
83.	E	10	6.200	0.632	4.19*
	I	91	4.341	1.384	
84.	E	10	5.400	1.075	3.54*
	I	92	3.804	1.377	
85.	E	10	5.700	1.059	2.80*
	I	90	4.233	1.615	

Table B-7 (continued)

Item	Type	n	m	sd	t
86.	E	10	6.100	0.738	3.79*
	I	91	4.560	1.258	
87.	E	10	4.100	2.331	2.61*
	I	91	2.780	1.413	

Note. * significant mean difference at the 0.05 level.

77. Study about preparing image carriers through lock-up techniques.

78. Study about preparing image carriers through photoengraving.

79. Study about preparing image carriers through engraving.

80. Study about preparing image carriers through molding.

81. Study about preparing image carriers through electroplating.

82. Study about preparing image carriers through electronic scanning.

83. Study about preparing image carriers through electrostatic processes.

84. Study about preparing image carriers through heat transfer.

85. Study about preparing image carriers through photopolymers.

86. Study about preparing image carriers through mechanical techniques (direct image, etc.).

87. Study about preparing image carriers through stencils.

Image Transfer Issues

The data concerning the individual items from this group are presented in Table B-8 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-8

Image Transfer Issues Item Analysis

Item	Type	n	m	sd	t
11.	E	10	5.800	1.135	2.87*
	I	93	4.441	1.448	
32.	E	10	6.400	0.843	2.44*
	I	93	5.409	1.253	
33.	E	9	6.556	0.726	2.55*
	I	92	5.500	1.218	
34.	E	10	5.700	0.823	0.70
	I	93	5.419	1.228	
57.	E	10	5.700	1.160	2.78*
	I	93	4.591	1.200	
88.	E	10	3.600	2.319	0.91
	I	90	3.111	1.532	
89.	E	10	5.500	1.434	3.00*
	I	91	3.846	1.673	
90.	E	10	6.100	1.197	4.44*
	I	90	3.756	1.617	

Table B-8 (continued)

Item	Type	n	m	sd	t
91.	E	9	6.444	0.726	4.41*
	I	92	4.207	1.501	
92.	E	10	3.500	2.273	1.22
	I	92	2.848	1.519	
93.	E	10	5.500	1.269	3.34*
	I	92	3.696	1.656	
94.	E	10	5.900	1.101	4.00*
	I	90	3.911	1.526	
95.	E	10	5.500	1.179	3.58*
	I	92	3.641	1.594	
96.	E	10	6.600	0.516	3.47*
	I	92	5.011	1.433	

Note. * significant mean difference at the 0.05 level.

11. Consider the role of the electrostatic technique (e.g., xerography) in the future of the graphic communication industry.

32. Study about the advantages and disadvantages of the reproduction methods and processes.

33. Know about the capabilities and capacities of reproduction methods and processes.

34. Reflect upon methods of reproduction best suited for product based on nature of the product.

57. Reflect upon alternative materials for production.

88. Know about transferring images through relief.

89. Know about transferring images through intaglio.

90. Know about transferring images through planography.

91. Know about transferring images through screen printing.

92. Know about transferring images through office duplicator (e.g., mimeography, spirit, gelatin).

93. Know about transferring images through electrostatic processes.

94. Know about transferring images through light absorbency techniques.

95. Know about transferring images through heat absorbency techniques.

96. Know about transferring images through photographic techniques.

Finishing and Binding Issues

The data concerning the individual items from this group are presented in Table B-9 in the order that each appeared. The individual items that made up this pooled variable group are found following the table.

Table B-9

Finishing and Binding Issues Item Analysis

Item	Type	n	m	sd	t
97.	E	10	6.500	0.527	3.82*
	I	93	4.925	1.287	
98.	E	10	6.300	0.823	3.12*
	I	93	5.108	1.175	

Table B-9 (continued)

Item	Type	n	m	sd	t
99.	E	10	6.200	0.919	2.95*
	I	93	5.032	1.211	
100.	E	10	5.900	0.876	2.34*
	I	93	4.979	1.207	
101.	E	10	5.300	0.823	1.87
	I	92	4.435	1.432	

Note. * significant mean difference at the 0.05 level.

97. Study about finishing products through assembly.

98. Study about finishing products through binding.

99. Study about finishing products through sizing and pre-assembly (e.g., scoring, folding, perforating, etc.).

100. Study about finishing products through special processes (e.g., die-cutting, embossing, gumming, etc.).

101. Study about finishing products through packaging.

APPENDIX C

EXPLANATORY COVER LETTER

University of Northern Iowa
Department of Industrial Technology

Industrial Technology Center
Cedar Falls, Iowa 50614
Phone (319) 273-2561

April 1989

(PERSONALIZED)

A survey of importance to graphic communication educators and representatives of graphic communication companies is being conducted as part of a research project in the Department of Industrial Technology at the University of Northern Iowa. The purpose of the study is to develop a list of competencies that may be used in graphic communication course development at the college and/or university level. The study will be especially helpful in reviewing the new graphic communication major offered by the University of Northern Iowa.

You have been identified as a participant in this study because you play an important role in the graphic communication profession. Your responses, along with the responses of others, will help graphic communication programs address the needs of contemporary industry by providing better training for future graduates. Accordingly, your response is critical to the success of this survey. All information collected will be confidential. The code number is only for checking off your returned survey.

The survey instrument has been designed for your convenience and a labeled return envelope has been enclosed. Would you complete the survey and return it within five (5) days of its receipt? This will eliminate my having to contact you again. If you would like to receive a copy of the survey results, please check the box at the end of the survey.

Thank you for your cooperation and your continued involvement in the graphic communication profession. I look forward to reporting the survey results to each of you.

Sincerely yours,

Eldon B. Swanson
Principal Investigator
Masters Degree Candidate

Major Advisor: Dr. Charles D. Johnson
Department of Industrial Technology
The University of Northern Iowa
Cedar Falls, Iowa 50614-0178
1-319-273-2561 Departmental Office

APPENDIX D

SURVEY SUPPORT LETTER

Printing Industries of the Midlands, Inc.
11009 Aurora Avenue
Des Moines, Iowa 50322
(515) 270-1009 or 1 800 234-7427

April 1989

(PERSONALIZED)

Dear PIM Member:

The Printing Industries of the Midlands, Inc. fully supports and endorses the research study currently being conducted by Mr. Eldon B. Swanson from the Department of Industrial Technology at the University of Northern Iowa. This study offers those of us in the graphic communication industry an opportunity to have a positive impact on the development of curriculum for graphic communication programs by offering our support and valuable input.

The study concerns itself with the development of a list of competencies that may be taught so that students will be better suited to enter the contemporary graphic arts industries. By offering to answer the questions you will find in the survey, your input will be combined and analyzed with that of college and/or university educators in our area. Hopefully, this will make not only education for the students better, but it will make our future employees better as well.

Please take a moment right now and answer the survey questions and return this study to Mr. Swanson as quickly as is possible. Thank you for your assistance.

Sincerely,

James R. Frey

James R. Frey, President
Printing Industries of the Midlands, Inc.

APPENDIX E

APPROVAL LETTER FOR SURVEY USE

TRENTON
STATE COLLEGE

Department of Technology Education

November 17, 1988

Eldon B. Swanson
University of Northern Iowa
Department of Industrial Technology
Cedar Falls, Iowa 50614

Dear Eldon:

This letter is to confirm that you have my permission to use all or any part of my survey instrument in your study.

Best wishes in your study.

Sincerely,

Dr. John R. Karsnitz, PhD.

Trenton State College, Hillwood Lakes CN 4700
Trenton, New Jersey 08650-4700 609-771-2543

APPENDIX F

CONTENT OF FOLLOW-UP POSTCARDS MAILED TO NON-RESPONDENTS

To Iowa Educators

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is that I receive your input. You were 1 of only 8 educators selected from the state of Iowa to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

To Iowa Industry Representatives

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is

that I receive your input. You were 1 of only 149 industry representatives selected from the state of Iowa to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

To Nebraska Educators

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is that I receive your input. You were 1 of only 8 educators selected from the state of Nebraska to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

To Nebraska Industry Representatives

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is that I receive your input. You were 1 of only 57 industry representatives selected from the state of Nebraska to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

To South Dakota Educators

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is

that I receive your input. You were 1 of only 2 educators selected from the state of South Dakota to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

To South Dakota Industry Representatives

May 11,1989

Dear Graphic Communications Professional,

Several days ago, you received an Industry and Education Graphic Communication Research Study that asked your opinion on a number of questions. Since I have not received your completed questionnaire, I wanted to send this short reminder and explain to you how important it is that I receive your input. You were 1 of only 2 industry representatives selected from the state of South Dakota to participate in this survey and your opinion is invaluable to my work. If your survey and this reminder have crossed in the mail, please accept my Personal Thank You.

Sincerely, Eldon B. Swanson-Principal Investigator

APPENDIX G

JOB TITLES OF RESPONDENTS

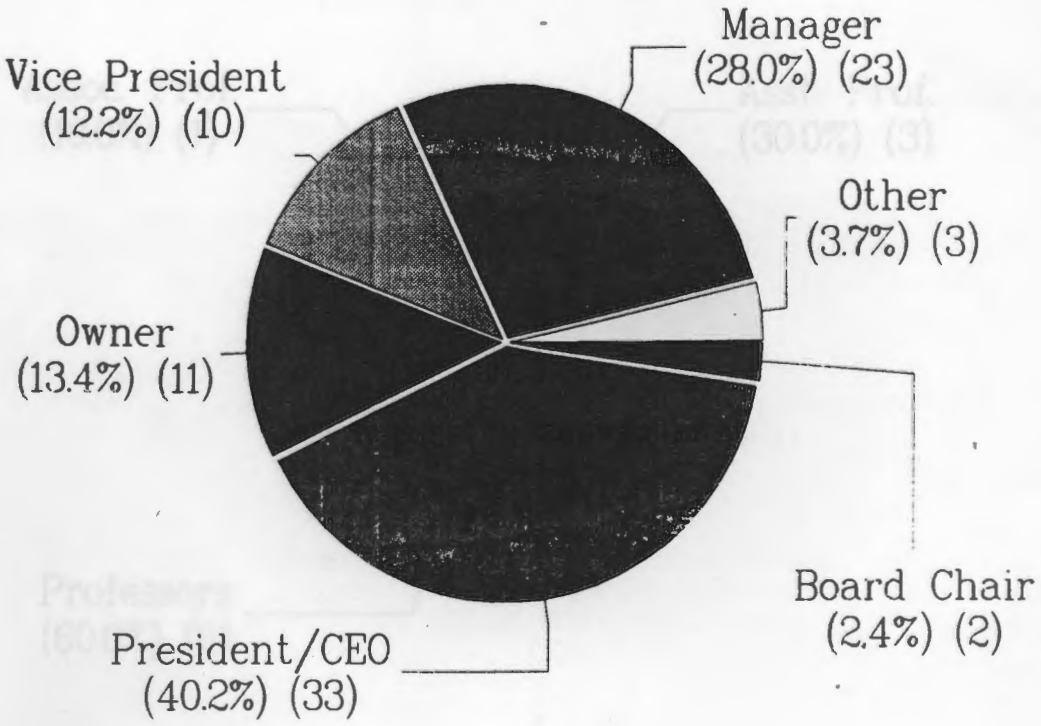

Figure 1. Job Titles of Industry Respondents

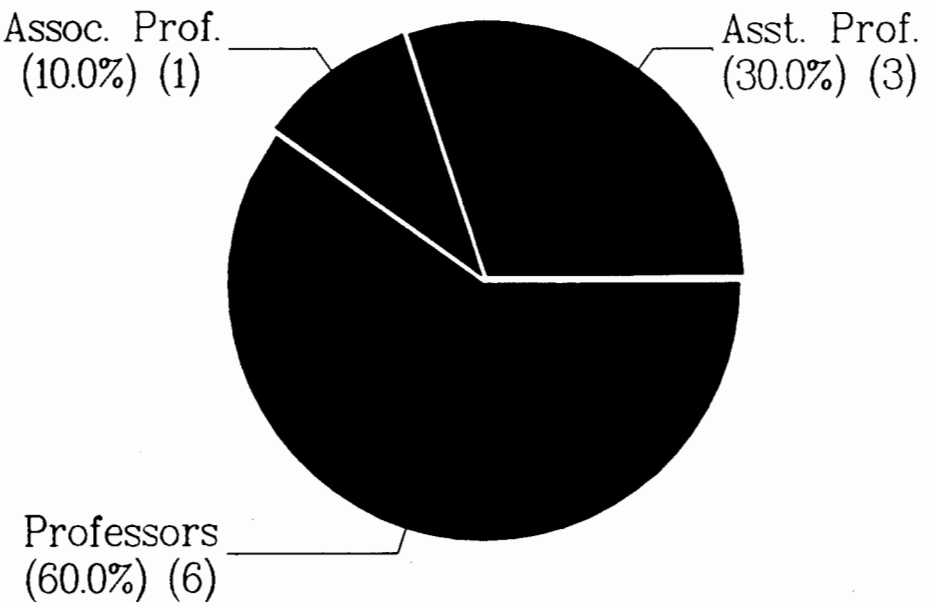

Figure 2. Job Titles of Educator Respondents

VITA

Eldon B. Swanson

November 10, 1947 . . . . . Born--Cedar Falls, Iowa

1973-1989 Freelance graphic/mechanical designer and illustrator

1980 . . . A.A.S., Mechanical Engineering Technology, Hawkeye Institute of Technology, Waterloo, Iowa

1980-1985 Operations Manager, Wayne Engineering, Inc. Cedar Falls, Iowa

1987 . . . B.A., Industry--Mechanical Design, University of Northern Iowa, Cedar Falls, Iowa

1987-1989 Graduate teaching assistant, Graphic Communications Laboratory, University of Northern Iowa, Cedar Falls, Iowa

1989 . . . M.A., Technology, Vocational-Technical Teaching, University of Northern Iowa, Cedar Falls, Iowa

Member: Epsilon Pi Tau

FIELDS OF STUDY

Major Field: Graphic Communications Technology, with emphasis in mechanical engineering technology, graphic communications technology, and vocational-technical education and teaching