IDENTIFICATION OF THE SIGNIFICANT COMPETENCIES IN GRAPHIC DESIGN

A Dissertation
Presented to
The Faculty of the Graduate School
University of Missouri-Columbia

In Partial Fulfillment
of the Requirements for the Degree

Doctor of Philosophy

---

by
Shyang-Yuh Wang

Dr. Bob R. Stewart
Dissertation Supervisor

DECEMBER 2006

© Copyright by Shyang-Yuh Wang 2006
All Rights Reserved

The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

IDENTIFICATION OF THE SIGNIFICANT
COMPETENCIES IN GRAPHIC DESIGN

presented by Shyang-Yuh Wang
a candidate for the degree of Doctor of Philosophy
and hereby certify that is their opinion it is worthy of acceptance.

Dr. Bob R. Stewart, Dissertation Director

Dr. Julie A. Caplow

Dr. Anthony M. Barbis

Dr. Mark Ehlert

Dr. Jesus J. Rodriguez

. . . . . To my family.

ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my advisor, Dr. Bob Stewart for guiding me along this way. I also would like to thank Dr. Anthony Barbis for coordinating program activities. I greatly appreciate the other members of my committee: Dr. Julie Caplow, Dr. Mark Ehlert, and Dr. Jesus Rodriguez. They provided me with their professional opinions on my study. Also, I would like to thank the panel of experts who participated in this study.

Thanks to my friends Dr. Carroll Graham and Judi Fast for proofreading my writing; Professor Robert Ferro and Professor Ray Bachura for helping on the initial survey instrument. Also, my appreciation goes to my friend and traveling partners Dr. Thomas Baldwin and his wife, Ardith, for encouraging me to pursue higher achievements.

There is a person that I respect, who has guided me on my study and life experience in the last eleven years; without him, I could not have gone this far. He is Dr. John T.H. Chen, Professor and Assistant to the President at Pittsburg State University.

My deepest appreciation shall go to my family, without their unconditional love and support, the completion of my program would have been impossible. I can not give enough thanks to my father, Keng-Sheng; my mother, Chu-Jung; or my brother Jerry and his wife Jesimy. And last, but not least, my wife Michelle and newborn daughter Tiffany.

TABLE OF CONTENTS

LIST OF TABLES

IDENTIFICATION OF THE SIGNIFICANT COMPETENCIES IN GRAPHIC DESIGN

Shyang-Yuh Wang

Dr. Bob Stewart, Dissertation Supervisor

ABSTRACT

The purpose of this research study was to obtain consensus and validation from a panel of experts in identifying the essential competencies in graphic design. Utilizing a panel of experts composed of industry representatives and educators, this study employed a modified Delphi Technique to gather data from 12 postsecondary and higher education educators and 18 industry representatives.

Educators' perceptions differed from industry practitioners' perceptions for five of the competencies. However, 66 significant competencies in graphic design were identified, and 63 were considered desirable. In addition, the panel members identified the 20 most needed competencies for employment in today's graphic design industry. Replication of the findings is recommended by the author.

CHAPTER I

INTRODUCTION

As the United States' third largest manufacturing industry, graphic communications requires more than a million people in a variety of challenging technical, creative, and professional occupations (Graphic Communications Council, 1999). In 2001, the graphic communications industry employed over 1.2 million people in more than 46,000 establishments, selling over $160 billion of products to consumers (Graphics Arts Network, 2005).

Graphic communications is one of the oldest fields in career and technical education. As a matter of fact, graphic communications has been a part of education since the invention of the printing press in the 15th century (Dailey, 2000; Dharavath, 2003). However, some emphases included in graphic communications such as graphic design, multimedia design, and internet webpage design are fairly new to educational programs and industry. According to the Graphic Communications Council (1999), graphic communications is very extensive; it includes, but is not limited to, graphic design, layout, typography, internet and webpage design, interactive multimedia, digital photography, digital image, reproduction, and all of the printing processes.

According to the Accrediting Council for Collegiate Graphic Communications (ACCGC), there are 20 postsecondary, and higher educational institutions offering graphic communications related programs in the states of Missouri and Kansas (2001). In addition, courses related to graphic communications are widely taught in career and technical education programs at many comprehensive high schools and career centers.

As a consequence of the rapid development of information and computer technology, the cost for personal computers and peripheral equipment has been decreasing. Thus, many people have the opportunity to use a personal computer to work on image and video editing, interactive multimedia design, webpage design, HTML programming, and e-business. Also, some areas in graphic communications are more and more popular, and the enrollments of some graphic communications programs have accelerated in the last decade. According to J. Rodriguez (personal communication, March 12, 2005) the number of students enrolled in the Commercial Graphics and Graphic Communications Management programs at Pittsburg State University (PSU), Pittsburg, Kansas has grown significantly. In 1997, PSU's records showed 170 students were enrolled in the programs. Recent records reflect the student enrollment increased to approximately

225 in 2004. Another good example would be the photography program at the University of Central Missouri (UCM). According to T. Baker (personal communication, May 5, 2004) this university's records reflected that 35 students enrolled in the program in 2000, and the same program recorded an increased enrollment to 180 students in the spring of 2004.

The graphic communications industry offers a host of career opportunities including management, sales, technical, creative, and support. Graphic communications graduates from a technical or community college often qualify for an entry-level or technician position in industry. Also, graduates of a four-year or university level graphic communications program qualify for entry-level supervisory, management-trainee, or middle-management positions (Dharavath, 2003; Flecker & Groff, 1998).

Need for the Study

Some emphases included in graphic communications are fairly new to educational programs and the literature reflects minimal effort in identifying competencies related to graphic communications; specifically in digital graphic design, multimedia design, and internet webpage design (Rodriguez, 2002). In addition, the development of technology has driven the cost of computer equipment down

significantly, and with increasing intensity educational institutions choose to develop or establish related programs since last decade (Kollmeier 1996). For these reasons, identification of essential competencies is important.

Identifying competencies in any area is difficult because of different views and program emphases. In order to reduce the differences in this study, the Delphi Technique was utilized to seek consensus from postsecondary and higher education educators in graphic communications, and industry representatives regarding perceptions of significant competencies (Adler & Ziglio, 1996; Wissema, 1982; Helmer, 1981; Cornish, 1977; Helmer, 1977).

Statement of the Problem

Graphic communications related programs, such as graphic design, webpage design, interactive multimedia design, and photography are taught at many community colleges and four-year universities. These programs are also taught in career and technical programs of comprehensive high schools and career centers. However, some emphases are fairly new, such as graphic design. Also, there is a lack of empirical evidence within the literature demonstrating essential competencies utilized by stakeholders. Therefore, to assist academics, students, workforce development

professionals, and potential job applicants, it is critical to identify the significant competencies for graphic communications, especially in the area of graphic design.

Purpose of the Study

The primary purpose of this research study was to obtain consensus and validation from a panel of experts in identifying the significant competencies for graphic design.

Research Questions

This study was guided by the following research questions:

1. What are the significant competencies for graphic design as perceived by industry representatives and educators?
2. Do the educators' perceptions differ from the industry representatives' perceptions on the graphic design competencies investigated in this study?
3. Among the competencies investigated in this study, which competencies are perceived by the educators as essential to curriculum development and instructional design?
4. Which 20 competencies are most needed for employment in today's graphic design industry?

Definition of Terms

In this study, the following terms were used. These definitions are important in understanding this research.

Competencies: The fundamental characteristics, knowledge, and skills of an individual that can be shown to predict performance on a job (Spencer, 1993).

Computer-related competencies: The competencies investigated in this study related to the use of computer software to produce artwork.

Delphi Technique: A group process technique developed by Dalkey and his associates in the Rand Corporation. This technique is employed to utilize written responses as opposed to bringing individuals together. The purpose is to collect the opinions from a panel of experts to improve the quality of decision making (Delbecq et al., 1975).

E-business: Electronic business. “The organized effort of individuals to produce and sell, for a profit, products and services that satisfy society’s needs through the facilities available on the Internet” (Canzer, 2003, p. 4).

Graphic Communications: All fields that participate in producing and disseminating visual elements, such as text and images in production to readers through

printed or electronic media (Lyons, 2000). Graphic Communications disciplines include printing management, prepress, press and publishing, advertising design, commercial photography, multimedia design, and graphic design.

HTML: Hypertext Makeup Language. “The principle computer programming language which is used to instruct computers in how to arrange web page content such as image, colors, and size and position of letters” (Canzer, 2003, p. 77).

Multimedia: The use of computers to present any combination of two or more of the following elements: text, graphics, video, animation, and sound in an integrated way (Acab, 1996).

Soft-skills related competencies: The competencies investigated in this study related to how people interact with each other. They include: teamwork, interpersonal skills, communication, leadership, creativity, and problem solving.

Task-oriented competencies: The competencies investigated in this study related to how the application of knowledge learned from instruction was put into practical use.

Technical-related competencies: The competencies investigated in this study related to the application of technical skills that were primarily learned from hands-on instruction.

Assumptions

The following assumptions were used for this study.

1. The emphases of study in graphic communications can be identified.
2. Panel participants are experts in graphic communications.
3. The significant competencies in graphic design can be identified by the industry representatives.
4. The significant competencies in graphic design can be identified by educators.

Limitations

In any study one can expect limitations that are outside the control of the researcher. The following limitations were recognized by the researcher as being viable:

1. The respondents may withdraw from participation during the process.
2. The respondents may fail to consider each question carefully.
3. The respondents may lack knowledge about the Delphi Technique process.

Delimitations

In any study one can expect delimitations that are chosen not to be included by the researcher. The following were the parameters that the researcher chose to place on the study (Leedy & Ormrod, 2001):

1. This includes the graphic design area, thus, other graphic communications areas were not included.
2. The panel of experts consisted of graphic communications educators and industry representatives.
3. This study was restricted to postsecondary and higher educational institutions and related individual representatives located in Kansas and Missouri.

Summary

As previously noted, identifying competencies in any area is difficult because of different views and program emphases. In order to reduce the differences, the Delphi Technique was utilized to seek consensus from postsecondary and higher education educators in graphic communications, and industry representatives about desired competencies. These experts were selected because of their level of knowledge and individual experience necessary to identify the significant competencies in their professional areas.

CHAPTER II

REVIEW OF LITERATURE

A review of literature was utilized to gain a clearer understanding of the disciplines of graphic communications. The review in this study included: early practices in graphic communications; consensus of the definition for graphic communications; comprehensive view of graphic communications; academics and graphic communications; graphic communications today; Delphi Technique; and competencies in graphic communications.

The main purpose of the literature review was to determine themes, strengths, and weaknesses of the past studies. The review also provided information about the gap in the literature that this study was designed to fill.

Early Practices in Graphic Communications

Since the invention of the printing press in the 15th century, people use printing techniques to print words, graphics and designs on paper, fabric, and metal or other suitable substrates with the use of pigments. These techniques are known as graphic arts or printing (Dharavath, 2003). These printed graphics and designs on the products are powerful methods used to convey information and ideas, and as well as the expression of feelings. Stakeholders have

given these techniques and industries a new term: graphic communications.

In the last decade, information and computer technology has accelerated. Consequently, many images, designs and words are transmitted electronically; therefore, graphic communications should not be limited solely to physical products.

Consensus of Definition for Graphic Communications

During the 74th annual International Graphic Arts Education Association conference in August 1999, a general definition of graphic communications (GC) was adopted. After the proposed definition was reviewed, improved and endorsed by the Graphic Communications Council and almost 50 other graphic communications organizations, the currently accepted definition of graphic communications is stated as follows:

> The processes and industries that create, develop, produce, and disseminate products utilizing or incorporating words or pictorial images to convey information, ideas, and feelings. Graphic communications products facilitate learning, enjoyment, motivation, and commerce. Graphic communications includes the family of market segments embracing the technologies of printing, publishing, packaging, electronic imaging, and their allied industries; they are often referred to as the graphic arts, print, or imaging industries. (Graphic Communications Council, 1999, p. 1)

Comprehensive View of Graphic Communications

The field of graphic communications is varied and extensive; it includes among other functions, graphic design, layout, typography, internet and webpage design, interactive multimedia, digital photography, digital image, reproduction, and all of the printing processes (Graphic Communications Council, 1999). Graphic communications can be identified as using techniques to incorporate text and typography, graphic, picture, and layout in all fields that participate in producing and disseminating visual elements. It can also be identified as using text and images in production to readers through printed or electronic media (Lyons, 2000). Graphic communications disciplines include printing management, prepress, press and publishing, advertising design, commercial photography, multimedia design, and graphic design.

Graphic design. It is defined as a comprehension of arranging and using illustrative elements, such as photographs, illustrations, icons, ruled line, or other non-text elements in a page layout (Lyons, 2000). Graphic design is inclusive, which also includes multimedia design, and webpage design.

Academics and Graphic Communications

In the educational system, graphic communications is one of the oldest fields in career and technical education or technology education. Previous researchers noted graphic communications has been a part of education since the invention of printing (Dharavath, 2003; Dailey, 2000). Graphic communications is one of the more mature fields in career and technical education; however, some emphases included in this evolving discipline such as multimedia design, internet webpage design, and digital graphic design, are fairly new to educational programs and industry.

According to the Accrediting Council for Collegiate Graphic Communications (ACCGC), there were 20 postsecondary and higher educational institutions offering graphic communications related programs in the states of Missouri and Kansas (2001). In addition, courses related to graphic communications are widely taught in the career and technical education programs at many comprehensive high schools, vocational high schools, and career centers (ACCGC, 2001).

The goal of graphic communications programs at the four-year college level is to prepare students for entry level supervisory, management-trainee, or middle-level management positions. In addition, programs in post-secondary level institutions prepare community college

education students to qualify for technician positions (Flecker & Groff, 1998; Dharavath, 2003).

Graphic Communications Today

As the United States' third largest manufacturing industry, the graphic communications industry requires more than a million people in a variety of challenging technical, creative, and professional occupations (Graphic Communications Council, 1999). In 2003, the graphic communications industry employed over 1.1 million people in more than 44,000 establishments, selling over $157 billion of products to consumers (Graphics Arts Information Network, 2005). According to Frank Romano, professor emeritus of the School of Print Media, Rochester Institution of Technology, graphic communications is a $1.2 trillion market including everything from creation to production to distribution (KBA North America, 2001).

Graphic communications has been moving beyond paper and ink. As quoted by Monte (2005) Rodriguez stated, "We also added the digital media, photography and screen printing emphases, and it is our responsibility to maintain and grow a program that has appeal and practicality and, at the same time, in keeping with the needs of the industry" (p. 67).

Identifying Technical Competencies

According to recent studies, the technical competencies can be identified in many ways. Dharavath (2003) created and used an instrument based on the review of literature to survey 478 printing companies to identify the competencies in printing management and related areas. Dharavath also used the same method to survey different groups of people.

The competencies in different fields have been identified by utilizing the Delphi Technique. Lunkenheimer (2002) utilized the Delphi Technique to identify e-commerce competencies from marketing education. Bickel (1998) chose the Delphi Technique to identify the essential functions in registered nursing education.

Technical education institutions, such as the College of Technology at Pittsburg State University, use advisory committees to ensure programs are updated. The advisement from the committees usually affects the curriculum (T. Baldwin, personal communication, February 12, 2006).

Delphi Technique

Delphi Technique is a group process tool used by organizations or researchers to utilize written responses as opposed to bringing individuals together (Delbecq et al., 1975). It is also defined as a “set of procedures for

formulating a group judgment for subject matter where precise information is lacking" (Dalkey et al., 1969, p. 1).

A Delphi Technique study is comprised of a series of questionnaires sent either by mail, fax, or via e-mail, to a selected panel of experts (Dunham, 1998). The first-round of questionnaires of a traditional Delphi Technique study asks experts to respond to broad/open-ended questions, such as: please list the technical competencies of graphic communications education at the high school level (Delbecq et al., 1975). The purpose of the first-round questionnaire is to obtain initial ideas from the experts in order to build the second-round of questions for the subsequent questionnaire. Each subsequent questionnaire will be built based upon the collected responses of the preceding questionnaire (Delbecq et al., 1975). When the consensus is reached, the process concludes (Dalkey, 1967; Delbecq et al., 1975).

It was suggested that the Delphi Technique can be used when:

1. The problem does not lend itself to precise analytical techniques but can benefit from subjective judgment on a collective basis;
2. The individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communication and may represent diverse backgrounds with respect to experience and expertise;

3. More individuals are needed than can effectively interact in a face-to-face exchange;
4. Time and cost make frequent group meetings infeasible;
5. The efficiency of face-to-face meetings can be increased by a supplemental group communication process;
6. Disagreements among individuals are so severe or politically unpalatable that the communication process must be refereed and/or anonymity assured; and
7. The heterogeneity of the participants must be preserved to assure validity of the results. (Bickel, 1998, p. 44; Linstone and Turoff, 1975, p. 4)

Delphi Technique advantages. The Delphi Technique has the advantage of minimizing conflicts within the panel of experts, since they do not meet fact-to-face (Helmer, 1983). In addition, it is useful for involving experts who face travel and schedule constraints and are unable to meet on a group basis level (Andrews & Allen, 2002).

Dunham (1998, p. 1) indicated that the Delphi Technique is “designed to take advantage of participants’ creativity as well as the facilitating effects of group involvement and interaction.” Rather than having participants to respond on fixed questions, the Delphi Technique allows them to provide their own opinions.

Higher levels of accuracy within the results are one of many advantages of using the Delphi Technique. The RAND Corporation conducted a series of experiments in 1968 to

compare face-to-face discussion with controlled-feedback interaction using group techniques. Fourteen groups consisting of upper-class and graduate students in group sizes of 11-30 participated in the experiments. The results indicated that anonymous controlled feedback was more precise than face-to-face discussion. The aforementioned experiments also used the Delphi Technique as a group technique, and the results were even more accurate (Dalkey, 1969).

Traditionally, the simplest way of reaching consensus has been conducting face-to-face discussion. However, some psychological factors might affect the outcomes. With the face-to-face format it is normal for some people with greater authority or louder voices to dominate the discussion (Helmer, 1983). The Delphi Technique affords each participant an equal voice in sharing their opinions and making their own decisions; therefore, the Delphi Technique limits the bandwagon effect of majority opinion. This effect commonly skewed the results of research utilizing face-to-face designs (Helmer, 1983; Tersine & Riggs, 1976; Lunkenheimer, 2002).

Delphi Technique disadvantages. The amount of time required to administer the Delphi Technique is considered a challenge to researchers and often viewed as a disadvantage. According to Delbecq et al., (1975) a total estimated minimum time to deploy the Delphi Technique is about 44 days. Consequently, it might decrease participants' motivation to continue their participations to complete the process. Obviously, it is not appropriate to use the Delphi Technique for time sensitive or routine decision making (Tersine & Riggs, 1976; Lunkenheimer, 2002).

In the traditional Delphi Technique design, the participants are presented with open-ended questions. Consequently, this method would take a longer completion time, and the participants might withdraw from participations. Thus, the newer, more effective method design evolved (Andrews & Allen, 2002).

Modification of Delphi Technique. The Delphi Technique can be modified to increase the efficiency of conducting a Delphi Technique study, and/or the accuracy of the results. Competencies in different fields have been identified by utilizing the Delphi Technique. Lunkenheimer (2002) provided a list of prospective competencies in the first-round rather than asking experts to develop the first-round statements. The list was created based on the literature review. Thus,

the process is systematically expedited without sacrificing integrity during the course of data acquisition.

In many Delphi Technique studies there are more than 50 items listed on the questionnaire. Consequently, the traditional approach requires the panel of experts to invest significant amounts of time when responding to the questionnaire. Thus, when utilizing the traditional Delphi Technique, maintaining focus when rating large numbers of items can become a problem. The Rotational Delphi Technique was specifically designed to increase the efficiency of using the Delphi Technique. In a Rotational Delphi Technique study, the experts are subdivided into several sub-panels, and the instruments are then “rotated” through the sub-panels during first and second rounds (Custer et al., 1999).

By taking advantage of computer technology, the data acquisition process can be minimized to approximately five days (Dunham, 1998). Dunham suggested that sending questionnaires electronically, such as fax and e-mail can significantly decrease the time required for completing a Delphi technique. However, the spam e-mail and e-mail overloaded issues would increase the probability of overlooking or ignoring the questionnaires by the participants.

Purpose and history. The Delphi Technique was developed by Olaf Helmer and Norman Dalkey in the RAND Corporation in the 1950s to address military issues (Delbecq et al., 1975; Andrews et al., 2002). The original experiment was designed to forecast the bombing targets in the U.S., and the estimated number of atomic-bombs needed to reduce the U.S. munitions output from the viewpoint of a former Soviet Union military strategic planner (Helmer, 1983).

More recently, Delphi Technique studies have been utilized for forecasting and evaluating planning in industries. Also, it has been used for planning education, health, and urban growth activities (Dalkey, 1969). In education, the Delphi Technique has been used in educational studies since 1964 (Brooks, 1979; Scarcella, 1997). It has been useful in “setting priorities, establishing research goals and forecasting the future” (Finch & Crunkilton, 1993 p. 156; Scarcella, 1997, p. 62).

Procedure. A Delphi Technique study comprises a series of questionnaires sent either by mail or via e-mail, to a panel of experts. The process is concluded when consensus is reached. There is no rule on how many rounds of questionnaires should be conducted; however, three rounds is suggested (Delbecq et al., 1975).

Since determining competencies in graphic communications, especially in graphic design, is relatively new, it would be appropriate to use a panel of experts to identify and validate the results. Procedures or steps guide researchers in the application of this design. Delbecq et al., (1975) outlined a 10 step procedure in utilizing a Delphi Technique study:

1. Develop the Delphi Technique question, and identify what information is desired and how the information will be used;
2. Select and contact respondents;
3. Select panel members;
4. Develop questionnaire #1 and test;
5. Analysis of questionnaire #1;
6. Develop questionnaire #2 based on the results of questionnaire #1 and test;
7. Analysis of questionnaire #2;
8. Develop questionnaire #3 based on the results of questionnaire #2 and test;
9. Analysis of questionnaire #2; and
10. Prepare a final report. (p. 86-105)

Delbecq et al., (1975) suggested the estimated minimum time to complete a Delphi Technique process is about 44 days. Depending on the research design, the process may need a longer completion time. Table 1 shows a suggested schedule to deploy a Delphi Technique study.

Table 1

Process Outline and Schedule for Delphi Technique (Delbecq et al., 1975, p. 87)

Activities	Estimated Minimum Time for Accomplishment
1. Develop the Delphi Technique question	1/2 day
2. Select and contact respondents	2 days
3. Select sample size	1/2 day
4. Develop questionnaire #1 and test	1 day
a. Type and send out	1 day
b. Response time	5 days
c. Dunning time (if used)	3 days
5. Analysis of questionnaire #1	1/2 day
6. Develop questionnaire #2 and test	2 days
a. Type and send out	1 day
b. Response time	5 days
c. Dunning time (if used)	3 days
7. Analysis of questionnaire #2	1 day
8. Develop questionnaire #3 and test	2 days
a. Type and send out	1 day
b. Response time	5 days
c. Dunning time (if used)	3 days
9. Analysis of questionnaire #3	1 day
10. Prepare a final report	4 days
a. Type report and send out	1 day
b. Prepare respondents' report	1 day
c. Type report and send out	1 day
Total estimated minimum time	44 1/2 days

Competencies in Graphic Communications

Dharavath's (2003) study identified numerous technical competencies in graphic communications emphases in printing and press competencies. A total of 86 completed survey instruments was returned. Thirty were from graphic communications educators and 56 were from industry. The significant competencies, which scored 3 or above on a 5-

point Likert-type scale were:

- Identify production requirements;
- Identify and provide customer needs;
- Select appropriate production materials;
- Analyze production problems;
- Communication directly with the customers;
- Evaluate the capabilities of production equipment;
- Identify characteristics of digital communications;
- Describe the relationships of telecommunication and multimedia;
- Apply concepts of training and development;
- Demonstrate electronic document delivery;
- Apply production standard;
- Analyze and interpret data statistically;
- Prepare production costing and estimating;
- Develop marketing plans and research;
- Use graphic communications technology;
- Shop floor management;
- Working well with others;
- Communicating effectively;
- Technical writing; and
- Decision making skills. (p.4)

Although this study identified numerous significant competencies in graphic communications, deficiencies within the literature exist relative to graphic design.

Industry profile. The Occupational Competency Analysis Profile: Communication Graphics (1995) identified the occupational, academic, and employable competencies needed to enter the graphic communications industry. This profile is comprehensive and includes soft skills and attitudes. The profile also includes competencies related to graphic communications, such as mathematics and sciences. This

approach would be a useful guideline applicable to graphic communications programs only at the secondary level.

Curriculum versus competencies. According to the Mississippi Curriculum Framework for Graphics and Print Communications (1995), the first year graphic communications students are taught fundamentals of safety issues, mathematics, and sciences. Moreover, in technical areas, students are taught layout, desktop publishing, photographic, and fundamentals of prepress. In the second year, students review what they have learned in the first year. In addition, students are given instruction on employability skills, job planning, and machine repair and adjustment.

In summary, the competencies or program guidelines of graphic communications programs in printing and prepress areas can be found in the publications, since they have a well documented history. However, few research studies on validating the essential competencies were found within the literature. Therefore, it is even more difficult to highlight within the literature needed competencies for the areas of graphic design. Thus, significant gaps within the literature warrant additional investigation as proposed by the researcher.

Summary

With the innovation and accelerated use of technology, graphic communications evolved to its present, well-regarded state. Disciplines effected, run the gamete from printing management to multimedia design. As a result, a trillion-dollar-plus economy emerged. Graphic communications has promoted extensive production and distribution in a globalized economy, numerous organizations were formed, and a modern definition evolved. Also, tens of thousands of jobs were created to accommodate the fast-paced knowledge economy and information age we live in today.

The traditional Delphi Technique offers the advantage of gathering data via written responses in a non-threatening, confidential manner. This method is valued because it conserves resources and offers the individuals an opportunity for creative input. Due to the time-consuming effects of the traditional approach, modified approaches are sometimes utilized to expedite data acquisition.

Previous Delphi Technique research within similar contexts provided valuable forecasting and evaluation for technical industry and planning for education, health, and urban growth functions. However, insufficient information is accessible within the literature identifying essential competencies required for the newly-defined discipline of

graphic communications. Thus, this research seeks to fill this gap and expand the base of knowledge pertaining to essential competencies in graphics communications utilized by educators, student, workforce development professionals, job seekers, and other stakeholders.

CHAPTER III

METHODOLOGY

This chapter focuses on the design of the study, modification procedures, target population, development of the research instruments, data collection, and data analysis.

Design of the Study

The Delphi Technique was the research procedure chosen as the plan and structure necessary to obtain the study's research questions (Delbecq, 1975). This group process technique was used to obtain consensus from a panel of experts in identifying the significant competencies for the graphic design discipline. The panel of experts was composed of educators at the postsecondary and higher education level and industry representatives.

Modifications of the Delphi Technique

A modified version of the Delphi Technique was used for this study. As previously stated, the traditional Delphi Technique involves three rounds of a questionnaire presented to the panel of experts in order to obtain a reliable consensus. In this study, the first three rounds of questionnaires were utilized to seek consensus from postsecondary and higher education educators in graphic communications/graphic design, and industry representatives

regarding perceptions of significant competencies. After the panel of experts identified all the significant competencies in graphic design, the fourth-round questionnaire was utilized to identify the 20 competencies most needed for employment in today's industry.

The first-round questionnaire was developed based upon a review of literature and consulting with three experts in education and industry. As a result, the panel of experts was offered a list of graphic design competencies in the first-round rather than the panel of experts developing the items in a traditional-styled Delphi Technique study. The experts were allowed to contribute their ideas while responding also to the first and second rounds of questionnaires. The results from the first-round questionnaire were presented in the form of a second-round questionnaire.

In the second-round questionnaire, the experts were asked to score the significant competencies identified on the first-round questionnaire, and they were allowed to contribute their ideas on why a competency should or should not be included. The results of the second-round questionnaire were presented in the form of a third-round questionnaire.

The third-round questionnaire did not include any

qualitative components. The experts were asked to score each significant competency identified in the second questionnaire.

The fourth-round questionnaire asked the experts to select up to 20 of the most essential competencies needed for employment in today's industry from the significant competencies identified in the preceding questionnaires.

Target Population

Panel of experts. The population/panel of experts consisted of postsecondary and higher education educators and industry representatives in graphic communications areas. The respondents/panel expert members were nominated by the Accrediting Council for Collegiate Graphic Communications, International Graphic Arts Education Association, Graphic Arts Technical Foundation, and Printing Industries Association of MidAmerica.

Delbecq et al. (1975) indicated that the respondents participating in a Delphi Technique study should have the following expected characteristics:

1. Feel personally involved in the problem of concern to the decision maker
2. Possess pertinent information to share
3. Are motivated to include the Delphi task in their schedule of completing tasks
4. Feel that the aggregation of judgment of a respondent panel will include information which they too value and to which they would not otherwise have access. (p. 87-88)

The respondents nominated by the Accrediting Council for Collegiate Graphic Communications, International Graphic Arts Education Association, Graphic Arts Technical Foundation, and Printing Industries Association of MidAmerica should meet these expectations. In addition, they were asked to commit to the completion of the study to reduce the possibility of members withdrawing during the process.

Panel size and recruitment. Delbecq et al. (1975) indicated that “few ideas are generated within a homogeneous group once the size exceeds 30 well-chosen participants” (p. 89).

This study relied on subject-matter expert data; therefore, soliciting nominations of experts from members within the target groups was appropriate (Delbecq et al., 1975). The preliminary goal was inviting 15 graphic communications educators and 15 industry representatives to participate this study.

Four executives from Accrediting Council for Collegiate Graphic, International Graphic Arts Education Association, Graphic Arts Technical Foundation, and Printing Industries Association of MidAmerica were contacted and asked for nominations of graphic communications experts from the industry, and higher educational institutions.

A total of 117 experts, including 20 educators and 97 industry representatives were identified. The initial invitation letters were sent by mail to the 20 educators and 50 randomly chosen industry representatives. The experts were given two weeks to make commitments. By the deadline, 22 experts, including 12 educators and 10 industry representatives agreed to serve on the panel. Subsequently, the remaining 47 industry representatives on the list were contacted by mail, and 8 of them confirmed their participation. Thus, the panel size of this study was 30, which included 12 educators and 18 industry representatives.

Instrumentation

The first-round questionnaire was developed based upon a review of literature and consulting with three experts in education and industry chosen by the researcher. Each research question was addressed within a specific section of the survey instrument.

A 7-point Likert-type scale was used by the panel of experts to rate each statement. A rating of 7 indicated the competency was considered *extremely desirable*; a rating of 6 indicated the competency was considered *desirable*; a rating of 5 indicated that the competency was considered *somewhat desirable*; a rating of 4 indicated the expert had *no opinion*

whether the competency was considered desirable or undesirable; a rating of 3 indicated that the competency was considered *somewhat undesirable*; a rating of 2 indicated that the competency was considered *undesirable*; and a rating of 1 indicated that the competency was considered *extremely undesirable*.

The respondents were invited to make comments about the listed competencies. Also, they were asked to provide their written opinions in the first and second rounds if they perceived additional competencies should be included in the study, and added to the questionnaire on the subsequent round.

This study comprised four rounds of questionnaires. The second-round questionnaire and subsequent questionnaires were based upon responses from the preceding questionnaire.

Data Collection

The first-round questionnaire along with a transmittal letter was sent via first class mail to each respondent by United States Postal Service (U.S.P.S.). The study's experts were instructed to respond within two weeks. To avoid spam e-mail and e-mail overloaded issues, U.S.P.S. first class mail service was the preferred method for questionnaire delivery for this study.

The responses of each round were analyzed, and a statistical summary was mailed to the study's experts along with the next-round questionnaire.

Data Analysis

Following each round the questionnaires were returned to the researcher, the scores were entered in tables, and a narrative was developed to report the results. The additional competencies suggested by the panel members were listed for scoring in the next round. The descriptive results, including means and standard deviations, were provided to the experts as a reference.

The experts were asked to score each of the competencies regardless of whether the expert panel member perceived the competency was significant and meaningful to stakeholders. The third-round questionnaire data from industry representatives and educators were analyzed and reported separately.

Descriptive statistics were used to analyze the data collected, and the means, and standard deviations were calculated to reflect the scores. The mean is the most commonly used statistical calculation. The standard deviation was used to describe the distribution of data (Glass & Hopkins, 1996). Each of the aforementioned measures

was used to report the data collected from the first three rounds of questionnaires.

Inferential statistics were used to analyze the data collected from the third-round questionnaires. Multiple *t*-tests were utilized to determine if the educators and industry representatives differed in their perceptions about the significant competencies and if those differences were statistically significant (Aron, Aron, & Coups, 2005).

The fourth-round questionnaires asked the experts to select the 20 most needed competencies for employment in today's graphic design industry. Frequencies were utilized to report the scores of the experts on this questionnaire and to address the needs of businesses for the future.

As shown in Table 2, a data analyses matrix reflects the guide this researcher used to ensure appropriate analysis of the research questions. Scales of measurement and the statistical technique employed to obtain the appropriate output are listed adjacent to each item.

Table 2

Data Analyses Matrix for Research Questions of Identification of Significant Competencies in Graphic Design

Research Question	Scale of Measurement	Statistical Technique
1. What are the significant competencies for graphic design as perceived by industry representatives and educators? (Third-round questionnaire)	Seven-point Likert-type scale	Descriptive: Mean & Standard Deviation
2. Do the educators' perceptions differ from the industry representatives' perceptions on the graphic design competencies investigated in this study? (Third-round questionnaire)	Seven-point Likert-type scale	Independent-samples *t*-test
3. Among the competencies investigated in this study, which competencies are perceived by the educators as essential to curriculum development and instructional design? (Third-round questionnaire)	Seven-point Likert-type scale	Descriptive: Mean & Standard Deviation
4. Which 20 competencies are most needed for employment in today's graphic design industry? (Fourth-round questionnaire)	Select 20	Frequency

Statistical Package for the Social Sciences (SPSS) was used for data processing, and results were reported in Chapter IV.

Summary

A modified version of the Delphi Technique was used to identify the significant competencies in graphic design. Thirty panel members, including 12 postsecondary and higher education educators in graphic communications/graphic design, and 18 industry representatives agreed to be participants in this study.

The panel members were asked to respond to four rounds of questionnaires. The first three rounds of questionnaires were utilized to seek consensus from educators and industry representatives, regarding their perceptions of significant competencies in graphic design. The fourth-round questionnaire was used to identify the 20 most needed competencies for employment in today’s industry from the significant competencies identified in the preceding questionnaires.

Descriptive statistics were used to analyze the data collected. The means and standard deviations were calculated to reflect the scores. In addition, inferential statistics were used to analyze the data collected from the third-round questionnaires. Multiple *t*-tests were utilized to determine if the educators and industry representatives differed in their perceptions about the significant competencies.

CHAPTER IV

RESULTS AND DATA ANALYSIS

This chapter is presented in four parts. First, a brief history of the data collection process and outcomes are reported. Second, results from each of the four research questions are presented. Third, when appropriate, tables are presented to allow for further data examination and to illustrate the results in a more concise manner, and fourth, a summary of the findings is presented.

Data Collection Processes

The first-round questionnaire was sent to all 30 panel members, and they were given two weeks to respond. The panel responded to the 24 beginning statements by indicating the level of desirability on a seven-point Likert-type scale. As shown in Table 3, 27 members returned the first-round questionnaire. This represented a return response rate of 90 percent. These participants also identified 36 new competencies, and those competencies were rated in the second-round and third-round. Among those 36 new competencies, 15 competencies were identified by the educators and 21 competencies were identified by the industry representatives (see Appendix M).

The second-round questionnaire was mailed to all panel members for rating of the listed items. The panel members

were asked to rate each of 60 statements. As shown in Table 3, 24 members responded and returned the second-round questionnaire. This represented a response rate of 80 percent. Also, as a result of the experts' input, six new competencies were identified by the industry representatives and rated in the third and forth rounds (see Appendix N).

The second-round questionnaire was deployed during the summer break and many participants indicated they were on leave and would not be available to respond to the questionnaire. Thus, this researcher decided to include those who did not respond to the second-round questionnaire in the third and fourth round questionnaires. As a result, the third and fourth-round responses were greater than the second-round responses to the questionnaire. Similar trends in response rates have been recorded in previous Delphi studies (Jillson, 2002; MacDonald, Ritchie, Murray, & Gilmour, 2000).

The panel members were instructed not to add any new competencies in the third-round questionnaire. In addition, the sole idea of utilizing the fourth-round questionnaire was to identify the most needed competencies for employment in today's industry. Consequently, the results of the third-round questionnaire would not affect the fourth-round rating. Thus, the third-round and fourth-round questionnaires were simultaneously mailed to panel members.

For the third-round, the panel members responded to the 66 statements and rated the items based on the previously mentioned Likert-type scale, and further, determined the significance of the proposed competencies. For the fourth-round, panel members were asked to choose *up to* 20 most needed competencies for employment in today's industry. After the deadline a letter was mailed to the participants encouraging those who had not responded to promptly complete and return the questionnaires. These participants were given a seven day extension to complete and return the questionnaires. As shown in Table 3, 28 members returned the third-round questionnaire. This represented a response rate of 93.3 percent. Also, as shown in Table 3, 27 experts returned the fourth-round questionnaire, which represented a return response rate of 90 percent.

Table 3

Participants' Response Rates for the Four Rounds of Questionnaires (N = 30)

Questionnaire	Number of Participants	Number of Responses	Percent of Response
First Round	30	27	90%
Second Round	30	24	80%
Third Round	30	28	93%
Fourth Round	30	27	90%

Research Results

Question 1. What are the significant competencies for graphic design as perceived by industry representatives and educators? As indicated in Table 4, 66 competencies were identified as significant by the participants on the expert panel. Furthermore, as perceived by the participants on the third-round, the mean scores for 63 of the competencies ranged from 5.0 to 7.0 indicating a substantial to strong desirability for each competency. Three competencies were rated as not desirable (see Appendix L).

Table 4

Descriptive Results of Significant Competencies in Graphic Design (N = 27)

1. Understand the history of graphic design.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.48	5.61	5.32
SD	1.45	1.34	1.22

2. Understand the history of graphic communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.30	5.36
SD	N/A	1.26	1.10

(Table 4, continues)

Table 4, continued

3. Understand the history of art.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	4.91	5.07
SD	N/A	1.28	1.05

4. Apply sales promotion techniques for advertisement and marketing.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.48	5.65	5.71
SD	1.45	1.11	1.36

5. Determine the costs associated with graphic design and other creative service.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.89	6.04	6.00
SD	1.05	1.2	1.12

6. Comprehend ethical behaviors in design professions.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.09	5.86
SD	N/A	0.90	0.89

7. Apply the concepts of economics in graphic communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.48	5.43
SD	N/A	1.08	0.96

(Table 4, continues)

Table 4, continued

8. Apply the theory and practice in E-commerce.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.57	5.50
SD	N/A	0.95	0.96

9. Apply the concepts of basic marketing.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.65	5.71
SD	N/A	0.98	0.85

10. Apply the theory and practice of basic finance.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.04	5.25
SD	N/A	0.98	0.93

11. Explain and evaluate customer service issues.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	4.93	5.74	5.71
SD	1.33	1.14	1.18

12. Apply the principles of graphic design.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.70	6.74	6.75
SD	0.72	0.45	0.44

(Table 4, continues)

Table 4, continued

13. Apply design concepts.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.74	6.61
SD	N/A	0.54	0.57

14. Apply the concepts of typography.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.78	6.65	6.50
SD	0.51	0.65	0.60

15. Apply the techniques of postscript output.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.13	6.00
SD	N/A	0.87	0.77

16. Apply basic knowledge of Gestalt psychology to graphic design.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.07	5.17	5.00
SD	1.59	1.15	1.12

17. Apply the understanding of basic journalism.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	4.91	5.07
SD	N/A	0.79	0.98

(Table 4, continues)

Table 4, continued

18. Explain the properties of paper, and its distribution and manufacturing processes.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.22	5.21
SD	N/A	1.38	1.13

19. Apply the theory and practice of basic finance for "small business".

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.09	4.93
SD	N/A	1.24	1.25

20. Comprehend the terms used in graphic communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.43	6.39
SD	N/A	0.95	1.10

21. Apply the basics of graphic design for multimedia.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.11	6.35	6.25
SD	0.80	0.78	0.80

22. Apply the basics of graphic design for print production.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.67	6.70	6.64
SD	0.55	0.56	0.63

(Table 4, continues)

Table 4, continued

23. Apply the basics of graphic design for webpage development.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.48	6.30	6.21
SD	0.70	0.88	0.96

24. Apply the basics of photography for graphic design purposes.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.22	6.26	6.32
SD	0.75	0.75	0.86

25. Perform graphic design creatively.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.85	6.91	6.82
SD	0.36	0.29	0.48

26. Apply the techniques of PDF workflow.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.09	6.07
SD	N/A	1.00	0.94

27. Apply the understanding of printing mechanics.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.74	5.71
SD	N/A	1.10	0.81

(Table 4, continues)

Table 4, continued

28. Apply the understanding of graphic communications trends.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.83	6.18
SD	N/A	0.98	0.67

29. Apply the concepts of packaging technology.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.48	5.57
SD	N/A	0.85	0.88

30. Apply the theories of organization and management.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.26	5.57
SD	N/A	0.92	1.03

31. Perform conceptual thinking and ability.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.30	6.29
SD	N/A	1.02	0.94

32. Apply the concepts of public relations and mass communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.39	5.50
SD	N/A	0.84	0.84

(Table 4, continues)

Table 4, continued

33. Apply the concepts of technical communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.43	5.36
SD	N/A	0.66	1.06

34. Apply the concepts of crossmedia publishing and document repurposing.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.48	5.32
SD	N/A	1.04	1.16

35. Prepare digital documents.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.52	6.35	6.63
SD	0.7	0.71	0.73

36. Apply the techniques of color management.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.30	6.26	6.18
SD	1.03	0.69	0.77

37. Apply the understanding of business law and copyright issues.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.57	5.50
SD	N/A	0.99	1.07

(Table 4, continues)

Table 4, continued

38. Apply basic knowledge of mathematics.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.09	5.11
SD	N/A	1.08	1.17

39. Apply the techniques of digital prepress.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.56	5.83	5.64
SD	1.40	1.07	0.95

40. Apply the techniques of photographic lighting.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.22	5.52	5.36
SD	1.28	0.85	0.91

41. Apply the techniques of photography.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.33	5.78	5.64
SD	1.21	0.95	0.87

42. Apply the techniques of screen printing.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	4.30	4.96	4.57
SD	1.10	1.40	1.50

(Table 4, continues)

Table 4, continued

43. Apply the techniques of drawing software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.81	5.87	5.89
SD	1.21	1.10	1.07

44. Apply the techniques of 3-D software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.22	5.25
SD	N/A	1.09	1.21

45. Apply the techniques of multimedia creation software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	5.96	5.43	5.39
SD	0.76	1.24	1.37

46. Apply the techniques of page layout and publishing software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.56	6.43	6.25
SD	0.75	0.99	1.08

47. Apply the techniques of image editing software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.19	6.35	6.14
SD	0.79	0.98	1.04

(Table 4, continues)

Table 4, continued

48. Apply the techniques of webpage development software.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.00	5.78	5.75
SD	0.92	1.24	1.40

49. Perform clear and concise verbal and written communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	6.22	6.57	6.50
SD	1.25	0.59	0.64

50. Apply the techniques of filmmaking.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	4.78	4.61
SD	N/A	1.35	1.45

51. Apply the techniques of research methods.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.65	5.57
SD	N/A	0.78	0.63

52. Apply the techniques of drawing.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.61	5.75
SD	N/A	1.08	0.89

(Table 4, continues)

Table 4, continued

53. Apply the concepts of problem solving.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.43	6.61
SD	N/A	0.99	0.63

54. Desire to improve and clarify.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.52	6.57
SD	N/A	0.79	0.63

55. Be able to teach or convey an idea, feeling and belief.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.35	6.36
SD	N/A	0.57	0.73

56. Be able to learn and comprehend.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	6.57	6.61
SD	N/A	0.59	0.57

57. Comprehend the basics of art appreciation.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.48	5.32
SD	N/A	1.16	0.86

58. Comprehend the importance of awareness of issues, history and culture.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.57	5.36
SD	N/A	1.27	1.22

(Table 4, continues)

Table 4, continued

59. Apply the techniques of digital scanning.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.52	5.21
SD	N/A	1.34	1.47

60. Investigate careers in graphic communications.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	5.61	5.36
SD	N/A	1.31	1.37

61. Apply the techniques of information and internet searching.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.93
SD	N/A	N/A	0.94

62. Understand web processes and protocols.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.57
SD	N/A	N/A	1.17

63. Apply the techniques of preparing portfolios.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.96
SD	N/A	N/A	0.74

(Table 4, continues)

Table 4, continued

64. Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.21
SD	N/A	N/A	1.20

65. Understand how paper/substrates affect printed images.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.86
SD	N/A	N/A	1.04

66. Understand how the grain and composition of paper affect finishing processes.

	First Round N=27	Second Round N=24	Third Round N=28
Mean	N/A	N/A	5.71
SD	N/A	N/A	0.98

N/A: The competencies that were not yet identified for rating at certain rounds of the questionnaire.

Question 2. Do the educators' perceptions differ from the industry representatives' perceptions on the graphic design competencies investigated in this study? The scores of these groups were independent of one another. Thus the independent-samples *t*-test was utilized to compare the perceptions of educators to industry representatives regarding significant competencies. As revealed in Table 5, based on the probabilities associated with the test statistics, educators and industry representatives differed

on their perception of five significant. As previously noted, on the questionnaire's Likert-type scale of 1-7, a rating of 7 indicated the competency was considered *extremely desirable*; a rating of 6 indicated the competency was considered *desirable*; a rating of 5 indicated that the competency was considered *somewhat desirable*; a rating of 4 indicated the expert had *no opinion* whether the competency was considered desirable or undesirable; a rating of 3 indicated that the competency was considered *somewhat undesirable*; a rating of 2 indicated that the competency was considered *undesirable*; and a rating of 1 indicated that the competency was considered *extremely undesirable*.

Results of the independent-samples *t*-test revealed the following statistically significant results: Item 6, "Comprehend ethical behaviors in design professions" revealed a significant difference between the two groups, $t(1, 26) = 2.109$; $P < .05$. The sample means are displayed in Table 6, which shows that educators ($M = 6.27$, $SD = .65$) scored significantly higher on item 6 than did industry representatives ($M = 5.59$, $SD = .94$).

Item 11, "Explain and evaluate customer service issues" revealed a statistically significant difference between the two groups, $t(1, 26) = -2.443$; $P < .05$. The sample means are displayed in Table 6, which show that

industry representatives (*M* = 6.12, *SD* = .99) scored significantly higher on item 11 than did educators (*M* = 5.09, *SD* = 1.22).

Item 16, “Apply basic knowledge of Gestalt psychology to graphic design” revealed a statistically significant difference between the two groups, $t(1, 26) = 2.68$; $P < .05$. The sample means are displayed in Table 6, which show that educators (*M* = 5.64, *SD* = .92) scored significantly higher on item 16 than did industry representatives (*M* = 4.59, *SD* = 1.06).

Item 37, “A Apply the understanding of business law and copyright issues” revealed a statistically significant difference between the two groups, $t(1, 26) = 2.109$; $P < .05$. The sample means are displayed in Table 6, which show that educators (*M* = 6.00, *SD* = .77) scored significantly higher on item 37 than did industry representatives (*M* = 5.18, *SD* = 1.13).

Item 51, “Apply the techniques of research methods” revealed a statistically significant difference between the two groups, $t(1, 26) = 2.47$; $P < .05$. The sample means are displayed in Table 6, which show that educators (*M* = 5.91, *SD* = .30) scored significantly higher on item 51 than did industry representatives (*M* = 5.35, *SD* = .70).

Table 5

Comparison of Mean Item Differences for Graphic Design Competencies between Educators and Industry Representatives (N = 28)

1. Understand the history of graphic design.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.82	0.75	10	1.81	.082
Industry	17	5.00	1.37	16		

2. Understand the history of graphic communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.82	0.60	10	1.87	.073
Industry	17	5.06	1.25	16		

3. Understand the history of art.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.10	0.83	10	0.08	.939
Industry	17	5.06	1.19	16		

4. Apply sales promotion techniques for advertisement and marketing.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.55	1.04	10	-0.52	.606
Industry	17	5.82	1.55	16		

5. Determine the costs associated with graphic design and other creative service.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.18	0.75	10	0.68	.501
Industry	17	5.88	1.31	16		

(Table 5, continues)

Table 5, continued

6. Comprehend ethical behaviors in design professions.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.27	0.65	10	2.11*	.045
Industry	17	5.59	0.94	16		

7. Apply the concepts of economics in graphic communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.55	0.93	10	0.51	.613
Industry	17	5.35	0.99	16		

8. Apply the theory and practice in E-commerce.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.45	0.69	10	-0.20	.845
Industry	17	5.53	1.12	16		

9. Apply the concepts of basic marketing.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.73	0.65	10	0.06	.950
Industry	17	5.71	0.98	16		

10. Apply the theory and practice of basic finance.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.00	0.89	10	-1.15	.259
Industry	17	5.41	0.94	16		

11. Explain and evaluate customer service issues.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.10	1.22	10	-2.44*	.022
Industry	17	6.12	0.99	16		

12. Apply the principles of graphic design.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.82	0.40	10	0.65	.521
Industry	17	6.71	0.47	16		

(Table 5, continues)

Table 5, continued

13. Apply design concepts.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.73	0.47	10	0.90	.377
Industry	17	6.53	0.62	16		

14. Apply the concepts of typography.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.64	0.50	10	0.83	.413
Industry	17	6.41	0.80	16		

15. Apply the techniques of postscript output.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.73	0.65	10	-1.55	.134
Industry	17	6.18	0.81	16		

16. Apply basic knowledge of Gestalt psychology to graphic design.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.64	0.92	10	2.68*	.013
Industry	17	4.59	1.06	16		

17. Apply the understanding of basic journalism.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.10	1.04	10	0.08	.934
Industry	17	5.06	0.97	16		

18. Explain the properties of paper, and its distribution and manufacturing processes.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.45	0.52	10	0.90	.377
Industry	17	5.06	1.39	16		

19. Apply the theory and practice of basic finance for “small business”.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	4.82	0.98	10	-0.37	.713
Industry	17	5.00	1.41	16		

(Table 5, continues)

Table 5, continued

20. Comprehend the terms used in graphic communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.18	1.17	10	-0.81	.425
Industry	17	6.53	1.07	16		

21. Apply the basics of graphic design for multimedia.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.45	0.69	10	1.09	.284
Industry	17	6.12	0.86	16		

22. Apply the basics of graphic design for print production.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.63	0.50	10	-0.04	.966
Industry	17	6.65	0.70	16		

23. Apply the basics of graphic design for webpage development.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.45	0.69	10	1.07	.294
Industry	17	6.06	1.09	16		

24. Apply the basics of photography for graphic design purposes.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.45	0.52	10	0.65	.522
Industry	17	6.24	1.03	16		

25. Perform graphic design creatively.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.91	0.30	10	0.78	.443
Industry	17	6.76	0.56	16		

26. Apply the techniques of PDF workflow.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.18	0.75	10	0.49	.626
Industry	17	6.00	1.06	16		

(Table 5, continues)

Table 5, continued

27. Apply the understanding of printing mechanics.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.63	0.50	10	-0.40	.690
Industry	17	5.76	0.97	16		

28. Apply the understanding of graphic communications trends.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.27	0.47	10	0.59	.559
Industry	17	6.12	.78	16		

29. Apply the concepts of packaging technology.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.91	0.83	10	1.69	.103
Industry	17	5.35	0.86	16		

30. Apply the theories of organization and management.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.64	1.21	10	0.26	.795
Industry	17	5.53	0.94	16		

31. Perform conceptual thinking and ability.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.55	0.69	10	1.19	.245
Industry	17	6.12	1.05	16		

32. Apply the concepts of public relations and mass communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.82	0.60	10	1.67	.108
Industry	17	5.29	0.92	16		

33. Apply the concepts of technical communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.27	1.35	10	-0.33	.742
Industry	17	5.41	0.87	16		

(Table 5, continues)

Table 5, continued

34. Apply the concepts of crossmedia publishing and document repurposing.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.64	1.21	10	1.17	.254
Industry	17	5.12	1.11	16		

35. Prepare digital documents.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.36	0.81	10	0.04	.971
Industry	17	6.35	0.71	16		

36. Apply the techniques of color management.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.00	0.77	10	-0.98	.334
Industry	17	6.29	0.77	16		

37. Apply the understanding of business law and copyright issues.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.00	0.77	10	2.11*	.045
Industry	17	5.18	1.13	16		

38. Apply basic knowledge of mathematics.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	4.91	1.30	10	-0.72	.480
Industry	17	5.24	1.09	16		

39. Apply the techniques of digital prepress.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.55	0.69	10	-0.43	.671
Industry	17	5.71	1.10	16		

40. Apply the techniques of photographic lighting.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.55	0.52	10	0.88	.389
Industry	17	5.24	1.09	16		

(Table 5, continues)

Table 5, continued

41. Apply the techniques of photography.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.91	0.54	10	1.32	.198
Industry	17	5.47	1.01	16		

42. Apply the techniques of screen printing.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	4.82	1.40	10	0.69	.495
Industry	17	4.41	1.58	16		

43. Apply the techniques of drawing software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.27	0.65	10	1.56	.132
Industry	17	6.65	1.22	16		

44. Apply the techniques of 3-D software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.36	1.21	10	0.40	.696
Industry	17	5.18	1.24	16		

45. Apply the techniques of multimedia creation software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.91	1.45	10	1.66	.110
Industry	17	5.06	1.25	16		

46. Apply the techniques of page layout and publishing software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.73	0.47	10	1.99	.057
Industry	17	5.94	1.25	16		

47. Apply the techniques of image editing software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.55	0.52	10	1.70	.102
Industry	17	5.88	1.22	16		

(Table 5, continues)

Table 5, continued

48. Apply the techniques of webpage development software.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.91	1.45	10	0.48	.639
Industry	17	5.65	1.41	16		

49. Perform clear and concise verbal and written communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.64	0.50	10	0.91	.373
Industry	17	6.41	0.71	16		

50. Apply the techniques of filmmaking.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.00	1.41	10	1.16	.256
Industry	17	4.35	1.46	16		

51. Apply the techniques of research methods.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.91	0.30	10	2.47*	.020
Industry	17	5.35	0.70	16		

52. Apply the techniques of drawing.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.00	0.63	10	1.21	.237
Industry	17	5.59	1.00	16		

53. Apply the concepts of problem solving.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.82	0.40	10	1.46	.157
Industry	17	6.47	0.72	16		

54. Desire to improve and clarify.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.64	0.67	10	0.43	.671
Industry	17	6.53	0.62	16		

(Table 5, continues)

Table 5, continued

55. Be able to teach or convey an idea, feeling and belief.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.36	0.92	10	0.04	.971
Industry	17	6.35	0.61	16		

56. Be able to learn and comprehend.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.55	0.69	10	-0.46	.652
Industry	17	6.65	0.49	16		

57. Comprehend the basics of art appreciation.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.18	0.60	10	-0.68	.501
Industry	17	5.41	1.00	16		

58. Comprehend the importance of awareness of issues, history and culture.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.64	1.21	10	-0.97	.341
Industry	17	5.18	1.24	16		

59. Apply the techniques of digital scanning.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.00	1.48	10	-0.61	.546
Industry	17	5.35	1.50	16		

60. Investigate careers in graphic communications.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.36	1.21	10	0.02	.984
Industry	17	5.35	1.50	16		

61. Apply the techniques of information and internet searching.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.27	0.90	10	1.60	.121
Industry	17	5.71	0.92	16		

(Table 5, continues)

Table 5, continued

62. Understand web processes and protocols.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.55	1.04	10	-0.09	.927
Industry	17	5.59	1.28	16		

63. Apply the techniques of preparing portfolios.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	6.09	0.70	10	0.72	.480
Industry	17	5.88	0.78	16		

64. Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.36	1.21	10	0.52	.605
Industry	17	5.12	1.22	16		

65. Understand how paper/substrates affect printed images.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.82	0.87	10	-0.16	.877
Industry	17	5.88	1.17	16		

66. Understand how the grain and composition of paper affect finishing processes.

	n	*M*	*SD*	*df*	*t*	*p*
Education	11	5.73	0.79	10	0.06	.956
Industry	17	5.71	1.10	16		

** p =<.05*

Question 3. As a result of the experts' responses to the questionnaire, a mean score of 6.5 was established regarding the perceived value of the 66 competencies investigated in this study. Question 3 sought to determine which graphics design competencies were perceived by the educators as essential to curriculum development and

instructional design. To address this question, the mean scores of the participants' perceptions on the third-round questionnaire were utilized. Among the 66 competencies investigated in the third questionnaire, the 11 educators perceived 12 items were more essential and relevant to curriculum development and instructional design than the remaining 54 items. As Table 6 reveals, item 25, "Perform graphic design creatively" reflected the highest mean score (M = 6.91, SD = 0.30) as perceived by the educators. Closely following was item 12, "Apply the principles of Graphic Design" (M = 6.82, SD = 0.40) and item 53, "Apply the concepts of problem solving" (M = 6.82, SD = .40). Furthermore, as revealed in Table 5, competencies listed as item numbers 13, 46, 14, 49, 54, 22, 31, 47, and 56 relate to the application of design concepts, page layout and publishing, concepts of typography, communications, improvement and clarification, print production, conceptual thinking, image editing, and being able to learn and comprehend. Mean scores for each of the 12 competencies were similar; however, measures of dispersion changed to a greater extent, indicating less congruence among the educators pertaining to competencies listed as items 54, 31, and 56.

Table 6

Most Important Competencies Perceived by the Educators as to Graphic Design Curriculum Development and Instructional Design (n = 11)

Item Number	Competency	Mean Score	SD
25	Perform graphic design creatively	6.91	.30
12	Apply the principles of graphic design	6.82	.40
53	Apply the concepts of problem solving	6.82	.40
13	Apply design concepts	6.73	.47
46	Apply the techniques of page layout and publishing software.	6.73	.47
14	Apply the concepts of typography.	6.64	.50
49	Perform clear and concise verbal and written communications.	6.64	.50
54	Desire to improve and clarify.	6.64	.67
22	Apply the basics of graphic design for print production.	6.63	.50
31	Perform conceptual thinking and ability.	6.55	.69
47	Apply the techniques of image editing software.	6.55	.52
56	Be able to learn and comprehend.	6.55	.69

Question 4. Which 20 competencies are most needed for employment in today's graphic design industry? The fourth-round questionnaire was intended to identify the most needed competencies for employment in today's graphic design industry. Each expert was asked to select up to 20 competencies deemed most essential for employment. All respondents selected at least 10 competencies they believed were needed for employment in today's graphic design industry. As shown in table 7, among 66 graphic design competencies identified by the panel of experts, 20 competencies were considered important by 10 or more respondents (see Appendix Q). Item 12, "Apply the principles of graphic design" was the most frequently selected competency chosen by 24 panel members. Closely following was item 22, "Apply the basics of graphic design for print production" chosen by 20 panel members.

Endorsement of the top six competencies by the expert panel members ranged between 67 percent and 89 percent, or a frequency of 18 to 24 from the 27 panel members. Furthermore, items 24, 35, and 36 respectively, "Apply the basics of photography for graphic design purposes", "Prepare digital documents", and "Apply the techniques of color management", received a lower ranking than did the remaining 17 competencies in the top 20 competencies most needed for

employment in today's graphic design industry. Those items also reflected a lower frequency rate of 10 out of 27.

Table 7

Most Needed Competencies for Employment in Today's Graphic Design Industry (N = 27)

Item	Competency	Frequency
12	Apply the principles of graphic design.	24
22	Apply the basics of graphic design for print production.	20
46	Apply the techniques of page layout and publishing software.	19
56	Be able to learn and comprehend.	19
23	Apply the basics of graphic design for webpage development.	18
53	Apply the concepts of problem solving.	18
14	Apply the concepts of typography.	17
25	Perform graphic design creatively.	17
31	Perform conceptual thinking and ability.	16
5	Determine the costs associated with graphic design and other creative service.	15
49	Perform clear and concise verbal and written communications.	14
13	Apply design concepts.	13
20	Comprehend the terms used in graphic communications.	13
47	Apply the techniques of image editing software.	13
54	Desire to improve and clarify.	13
55	Be able to teach or convey an idea, feeling and belief.	12
21	Apply the basics of graphic design for multimedia.	11
24	Apply the basics of photography for graphic design purposes.	10
35	Prepare digital documents.	10
36	Apply the techniques of color management.	10

Summary of the Findings

As a result of panel members' responses to question one, 66 essential competencies were identified by the panel members in the first and second rounds of questionnaires. All competencies were rated in the third-round. Sixty-three competencies scored five or greater on the mean, a strong indicator of the most essential or significant competencies utilized by graphic design educators and industry stakeholders.

The second research question sought to determine whether or not the educators' perceptions differed from industry representatives' perceptions on graphic design competencies. Respondents' scores from the third-round questionnaire revealed statistically significant differences on five of the 66 competencies as perceived by the educators and industry representatives.

The third research question sought to determine which graphics design competencies are essential to curriculum development and instructional design. Twelve competencies scored 6.5 or higher on the mean by educators. In addition, the respondents' scores reflected standard deviations of those competencies were all less than .70, indicating the panel members' consensus regarding desirable competencies.

The fourth research question sought to identify the competencies perceived as most needed for today's graphic design industry. Twenty competencies were considered essential or significant for today's graphic design industry by 10 or more panel members. Two competencies were selected more frequently than the other 18 reported by the expert panel and reflected frequencies of 24 and 20, respectively: Item 12, "Apply the principles of graphic design" and Item 22, "Apply the basics of graphic design for print production." Item 35, "Apply the techniques of color management" had the lowest frequency among the 20 essential competencies perceived by the panel of experts.

CHAPTER V

SUMMARY, FINDING, CONCLUSIONS, IMPLICATIONS, DISCUSSION, AND RECOMMENDATIONS FOR FUTHER RESEARCH

The summary, findings, conclusions and implications, discussion, and recommendations for further research are the main areas presented in this chapter. In addition, the primary purpose and the research questions that guided this study are offered for review in the summary.

Summary

The purpose of this research study was to obtain consensus and validation from a panel of experts in identifying the significant competencies for graphic design. The panel of experts was composed of industry representatives and educators.

The following research questions guided this study:

1. What are the significant competencies for graphic design as perceived by industry representatives and educators?
2. Do the educators' perceptions differ from the industry representatives' perceptions on the graphic design competencies investigated in this study?
3. Among the competencies investigated in this study, which competencies are perceived by the educators as

essential to curriculum development and instructional design?

4. Which 20 competencies are most needed for employment in today’s graphic design industry?

Findings, Conclusions, and Implications

The research questions and subsequent findings used to address the purpose of this research required the researcher to analyze the study’s results in a holistic manner. This approach embraces the concept that one cannot fully appreciate the essential competencies of graphic design in today’s business environment by viewing the results of a single research question. In other words, a conclusion may be drawn from one of this study’s four research questions, but should be viewed in relationship to the results of the three remaining questions and their value to all stakeholders.

From a broad perspective, question one sought to determine which competencies were significant among the 66 investigated. Based on the responses of the expert panel, it was concluded that 63 of the 66 competencies were viewed as more significant as perceived by the respondents. This conclusion is supported by respondents’ mean scores ranging from 5.0 to 7.0, indicating a strong desirability for each competency. Respondents’ mean scores on 10 competencies were

greater than 6.5, the mean for the 66 competencies, and may be considered more important than the remaining 56 investigated. This conclusion is also supported by less dispersion among the scores of the highest ranking competencies when compared to the standard deviations of respondents' scores on the other competencies listed in the questionnaire.

Numerous competencies are perceived to be significant to educators and the graphics design industry. Those competencies should be included when developing a graphic design curriculum. Further, when examined in conjunction with the measures of dispersion, hierarchal ranking of competencies is noted. Furthermore, among the 66 competencies studied the results imply distinct preferences do exist among the panel of experts for the competencies.

Question 2 sought to determine if the educators' perceptions differed from the industry representatives' perceptions regarding the 66 graphic design competencies investigated in this study. It was found that there were statistically significant differences on five of 66 competencies when comparing educators' and industry representatives' results using a *t*-test. On four competencies, items 6, 16, 37, and 51, educators' mean scores were greater than those of industry representatives.

The five competencies related to, comprehension of ethical behavior, applying basic knowledge of Gestalt psychology to graphic design, customer service, applying the understanding of business law and copyright issues, and applying techniques of research methods. Furthermore, on item 11, explaining and evaluating customer service, industry representatives' mean scores were significantly higher than educators' mean scores. Also, there were no statistically significant differences between educators' and industry representatives' scores found for the remaining 61 competency statements investigated.

As mentioned previously, advisory committees are used by technical educational programs to ensure programs are updated. The results suggested that when developing a graphic design curriculum, educators may want to direct more attention to task-oriented competencies. Explaining and evaluating customer service is one example. They should work with educators to develop a curriculum which is acceptable by educational institutions as well as industries.

Question 3 sought to determine which graphic design competencies were perceived by the educators as essential to curriculum development and instructional design. It was concluded that 63 competencies were desirable. As perceived by the educators, 12 competencies were considered more

essential than the remaining 54 competencies. This finding is supported by mean scores on the 12 competencies that ranged from 6.55 to 6.91 in conjunction with standard deviation scores that ranged from .30 to .69. Furthermore, as perceived by the educators, it was concluded that the most desirable competencies related to curriculum development and instructional design encompass creativity, application of graphic design principles, design concepts, problem solving, page layout and publishing software, clarity, and communications.

This suggests that educators are inclined to select curriculum and design instruction based on specific competencies. Furthermore, educators may lack an understanding of the importance of some task-oriented competencies and fail to grasp their significance and overall value. The results indicated which competencies have been considered more important for instructional design in today’s graphic design educational programs. This is a valuable reference, especially for those educators developing a graphic design program.

As perceived by the industry representatives, those 12 competencies were also considered essential, and the mean scores of those competencies ranged from 5.88 to 6.76. In addition, item 20, Comprehend the terms used in graphic

communications (M = 6.53, SD = 1.07) and item 43, Apply the techniques of drawing software (M = 6.65, SD = 1.22) scored 6.5 or greater on the mean, as perceived by the industry representatives (see Appendix O).

Question number four, perhaps the most important research question in the study, sought to determine “What are the most important competencies in graphic design for employment in today’s business environment?” The panel of experts identified 20 competencies for the graphic design profession.

Based on their responses, it was found that six of the 12 most frequently selected competencies are *design-oriented.* Items 12, 46, 23, 14, 25, and 13 relate to applying the principles of graphic design, page layout, webpage development, concepts of typography, and design creativity. This was supported by respondents’ frequency scores ranging from 13 to 24 out of a possible high of 27.

Furthermore, based on the responses of the panel of experts, it was found that items 56, 53, 31, and 49 were *soft-skills-related* competencies that ranked in the top 12 of the 20 most essential competencies. This finding was supported by respondents’ frequency scores ranging from 14 to 19 out of a possible high of 27. These competencies included the ability to learn, comprehend, problem solve,

think conceptually, and to exercise verbal and written competencies.

Finally, it was found that the three least desirable competencies from the 20 cited by the panel experts, items 24, 35, and 36, included basics of photography for graphic design, digital document preparation, and techniques of color management. These competencies may be described as t*echnical- and computer-related*. This finding is supported by respondents' low frequency scores of 10 on each of these competencies.

Therefore, it may be concluded that *design-oriented* competencies are the most desirable for employment in today's graphics design business environment, and should be included in the curriculum. Furthermore, *soft-skills-related* competencies are slightly less important but should be considered compulsory for graphics design professionals. Finally, the respondents' low scores on the t*echnical- and computer-related* items imply fewer skills, knowledge, and abilities may be needed to master and utilize these competencies. Though viewed with a lesser hierarchical level from the holistic perspective, it is noteworthy that these competencies were identified among the top 20 by the panel of experts and remain important to the graphics design stakeholders.

Discussion

The Delphi method has been successfully utilized to establish consensus for career counseling methods, leadership assessment questionnaires, smoking prevention practices, and a host of other research inquires (Spangenberg & Theorn, 2002; Gary & Hache, 1995; Davis, Huebner, Piercy, Shettler, & Meszaros, 2004). However, this research was developed for another purpose and partially fills a void in the literature by identifying essential competencies in graphic design. The findings in this study also establish statistical and practical significance useful to researchers, industry representatives, job seekers, and other related stakeholders interested in maximizing human capital potential and improving organizational performance.

This study distinguishes itself from previous research by focusing on print and prepress technical competencies in graphic communications (Dharavath, 2003). The results of this research establishes a guide for developing curriculum in graphic design, and provides a template for isolating strengths and weaknesses in present programs.

Industry representatives, or practitioners of graphic design, may favor a curriculum that places more value on mastering competencies that are seen as task-oriented, and less academic in nature. To the contrary, educators

perceived knowledge-based competencies as being of greater value and should be given equal attention or a similar appraisal within this context.

Recommendations for Future Research

We live and compete in a globalized market, where consumer preferences change overnight (Holton & Baldwin, 2003) and dynamic technological advances frequently impact the way educators and graphic design practitioners meet the needs of various stakeholders. Within the context of what some call the information age and the knowledge economy (Marquardt, 2002) there is a critical need to build on this research and ensure appropriate curriculum is available for education specialists. Thus, future research should be more expansive and conducted in other geographic regions. There is a need to replicate these findings and determine if educators and industry practitioners need to realign educational programs and practices. Additional research and confirmation of these results could eventually impact the supply of well-educated workers, advance numerous careers, and provide students with high-quality education and potential for employment.

REFERENCES

Acab, M. R. (1996). *What is multimedia.* Retrieved September 1, 2006, from http://www.cse.yorku.ca/Courses95-96/4361/q1.html

Accrediting Council for Collegiate Graphic Communications. (2001, September). *Accreditation manual of the Accrediting Council for Collegiate Graphic Communications(ACCGC)*. Sewickley, PA: ACCGC.

Adler, M., & Ziglio, E. (1996). *Gazing into the oracle*. Bristol, PA: Jessica Kingsley.

Andrews, C. G., & Allen, J. M. (2002). Utilization of technology-enhanced Delphi Techniques. *Workforce Education Forum, 29*(1),3-17.

Aron, A., Aron, E. N., & Coups, E. J. (2005). *Statistics for the behavioral and social sciences: A brief course (3rd ed.)*. Upper Saddle River, NJ: Pearson Prentice Hall.

Bickel, L. S. (1998). Essential functions in registered nursing education: A Delphi study. *Dissertation Abstracts International,* 59(08), p. 2877. (UMI No. 9901218)

Brook, K. W. (1979, Winter). Delphi technique: Expanding applications. *North Central Association Quarterly*, 53(3), 377-385.

Brzozowski, R. J. (1988). *The relationship of selected student and teacher characteristics with competency in agricultural mechanics.* Unpublished doctoral dissertation, University of Missouri-Columbia, 1988.

Canzer, B. (2003). *E-business: Strategic thinking and practice.* Boston: Houghton Mifflin.

Cornish, E. (1977). *The study of the future.* Washington, D.C.: World Future Society.

Custer, R. L., Scarcella, J. A., & Stewart, B. R. (Spring, 1999). The modified Delphi technique - A rotational modification. *Journal of Vocational and Technical Education, 15*(2), 50-58.

Dailey, D. W. (2000). Graphic communications education: Where is it headed in the new millennium? *Visual Communications Journal 2000,* 1-4. Reston, VA: IGAEA.

Dalkey, N. (1968). *Predicting the future.* Santa Monica, CA: Rand Corporation.

Dalkey, N. (1969). *The Delphi method: An experimental study of group opinion.* Santa Monica, CA: RAND Corporation.

Dalkey, N., Brown, B., & Cochran, S. (1969). *The Delphi method, III: Use of self ratings to improve group estimates.* Santa Monica, CA: Rand Corporation.

Davis, S., Huebner, A., Piercy, F., Shettler, L., & Meszaros, P. S. (2004). Female adolescent smoking: A *Delphi* study on best prevention practices. *Journal of Drug Education, 34*(3), 259-311.

Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975). *Group techniques for program planning: A guide to nominal group and Delphi processes.* Glenview, IL: Scott, Foresman and Company.

Dharavath, H. N. (2003). *Identification of the skills needed by workers in various segments of the mountain states graphic communications industry*. Menomonie, WI: University of Wisconsin-Stout. (ERIC Document Reproduction Service No. ED 475 154)

Dharavath, H. N. (2003, February/March/April). Importance of technical competencies in the graphic communications technology curriculum as perceived by the graphic communications industry and educators. *Journal of Industrial Technology, 19*(2), 2-7.

Dunham, R. B. (September 1, 1998). *The Delphi Technique*. Retrieved November 11, 2004, from http:// instruction.bus.wisc.edu/obdemo/readings/delphi.htm

Finch, R. C., & Crunkition, J. R. (1992). *Curriculum development in vocational and technical education: Planning, content, and implementation* (4th ed.). Needham Heights, MA: Allyn and Bacon.

Flecker, S. A., & Groff, P. J. (1998). *Careers in graphic communications: A resource book.* Sewickley, PA: GATF Press.

Gaff, J. G., Ratcliff, J. L. & Associates. (1996). *Handbook of the undergraduate curriculum*. San Francisco, CA: Jossey-Bass Publishers.

Glass, G. V., & Hopkins, K. D. (1996). *Statistical methods in education and psychology (3rd ed.)*. Boston: Allyn and Bacon.

Graphic Communications Council. (1999). *Definition of graphic communications and explanatory paragraphs*. Retrieved January 10, 2004, from http://www.teched.vt.edu/gcc/Html/VirtualTextbook/PDFs/DefinitionOfGraphicComm.pdf

Graphic Arts Information Network. (2005). *Industry trends.* Retrieved February 1, 2005, from http://www.gain.net/industry/index.html

Harrison, L. L. (1981). *The comparative effect of affective work competencies and self concept on classroom performance in disadvantaged, handicapped, and regular vocational students.* Unpublished doctoral dissertation, University of Missouri-Columbia, 1981.

Heller, S. (2003). *Teaching graphic design.* New York: Allworth Press.

Helmer, O. (1977). Problems in futures research: Delphi and causal cross-impact analysis. *Futures*, February 1977, 17-31.

Helmer, O. (1981). Reassessment of cross-impact analysis. *Futures*, October 1981, 389-400.

Helmer, O. (1983). *Looking forward: A guide to futures research.* Beverly Hills, CA: Sage Publications.

Hesse, C., & Hesse, K. (Fall, 2003). What’s next? A preliminary resume of the past decade of digitalized communications. *Design Management Journal*, 14(4), 38-43.

Holton, E. F. III, & Baldwin, T. T. (2003). Making transfer happen: An action perspective on learning transfer systems. In E. F. Holton, III, and T. T. Baldwin, (Eds.), *Improving learning transfer in organizations* (pp. 3-15). San Francisco: Jossey Bass.

Illinois Occupational Skill Standards and Credentialing Council. (August 2000). *Illinois occupational skill standards: Imaging/pre-press cluster.* (ERIC Document Reproduction Service No. ED 448 354)

Jeffery, G., & Hache, G. (1995). A group-based Delphi application: Defining rural career counseling needs. *Measurement & Evaluation in Counseling & Development 28*(1), 45-60.

Jillson, I. A. (2002). *The national drug-abuse policy Delphi: Progress report and finding to date*. Retrieved December 1, 2006, from http://www.is.njit.edu/pubs/delphibook/ch3b3.html

KBA North America. (September 6, 2001). *Xerox powers up printing industry presence with 15 new offerings.* Retrieved April 10, 2005, from http://members.whattheythink.com/news/newslink.cfm?id=3603

Kollmeier, H. H. (June 1996). Creating an undergraduate InfoTech major. *Proceedings of Association of Small Computer Users in Education, USA,* 106-109.(ERIC Document Reproduction Service No. ED 405 823)

Leedy, P. D., & Ormrod, J. E. (2001). *Practical research: Planning and design.* Upper Saddle River, NJ: Prentice-Hall, Inc.

Lunkenheimer, G. (2002). Identifying e-commerce competencies from marketing education: A national Delphi study. *Dissertation Abstracts International,* 63(05), p. 1969. (UMI No. 3052196)

Lyons, D. J. (2000). *Graphic communications dictionary.* Upper Saddle River, NJ: Prentice Hall.

Marquardt, M.J. (2002). *Building the learning organization,* (2nd Ed.). Palo Alto, CA: Davies-Black.

McCampbell, W. H. (1989). *A career ladder program designed to involove vocational educators in Missouri.* Unpublished doctoral dissertation, University of Missouri-Columbia, 1989.

Macdonald, E. B., Ritchie, K. A., Murray, K. J., & Gilmour, W. H. (2000). Requirements for occupational medicine training in Europe: A Delphi Study. *Occupational and Environmental Medicine*, 57, 98-105.

Meggs, P. B. (1998). *A history of graphic design* (3rd ed.). New York: John Wiley & Sons, Inc.

Mississippi State University. (August 1, 1995). *Mississippi curriculum framework for graphics and print communications.* (ERIC Document Reproduction Service No. ED 397 345)

Monte, K. E. (February, 2005). The next impression. *Printing Impressions 47*(9), 66-67.

Ohio State Department of Education, Division of Career-Technical and Adult Education. (September 14, 2001). *Graphic communications: FasTrak specialization integrated technical and academic competency (ITAC).* (ERIC Document Reproduction Service No. ED 458 380)

Prugh, P. E. (1980). *Competencies required for entry-level semiprofessional accounting positions in Missouri.* Unpublished doctoral dissertation, University of Missouri-Columbia, 1980.

Rodriguez, J. (2002). *Development and implementation of curriculum for training of graphic communications high school teachers in a changing world*. Unpublished article.

Scarcella, J. A. (1997). Plastering competencies identified as important for twenty-first century contractors: A rotational Delphi. *Dissertation Abstracts International,* 59(07), p. 2400. (UMI No. 9841180)

Spangenberg, H. H., & Theron, C. C. (2002). Development of a uniquely South African leadership questionnaire. *South African Journal of Psychology, 32*(2), 9-26.

Spencer, S. M., & Spencer, L. M. (1993). *Competence at work: Models for superior performance.* Hoboken, NJ: John Wiley & Sons.

Tersine, R., & Riggs, W. (April, 1976). The Delphi technique: A long-range planning tool. *Business Horizons*, *19*(2),51-56.

Vocational Instructional Materials Laboratory, The Ohio State University. (1995). *Graphic communications: Occupational competency analysis profile.* (ERIC Document Reproduction Service No. ED 386 550)

Winzenried, A. (1997). *Delphi studies: The value of expert opinion bridging the gap-Data to knowledge.* (ERIC Document Reproduction Service No. ED 412 971)

Wissema, J.G. (1982). Trends in technology forecasting. *R & D Management*, 12(1), 27-36.

Yuche, J. W., & Stewart, B. R. (2001). *International business competencies needed by business graduates in the United States and Taiwan, R.O.C..* Paper presented at the Annual Meeting of the American Vocational Education Research Association, New Orleans, LA. (ERIC Document Reproduction Service No. ED 473 769)

Appendix A

Recruitment Letter

Name
Address

Date: March 2, 2006

Dear Mr./Ms.,

I am a doctoral candidate in the Department of Learning, Teaching and Curriculum at the University of Missouri-Columbia. For my dissertation research, I will be asking a panel of experts in the field of graphic communications, to identify significant competencies in graphic design -- using the Delphi Technique.

The purpose of my research study is to obtain consensus from a panel of experts in identifying the essential competencies in graphic communications, especially graphic design. The panel of experts will be composed of industry representatives and educators.

Members of a Delphi panel are generally recognized and nominated by professional organizations. Therefore, I would like to ask for your assistance in nominating up to 15 graphic communications educators in postsecondary and higher educational institutions in Kansas or Missouri. I will then contact them to explain the purpose of my study and the commitments required should they choose to participate. Please e-mail me the contact information of the experts you would like to nominate by March 15.

Thank you very much for your assistance. Should you have any questions, please contact me at: (620)235-4340 or sw976@missouri.edu.

Sincerely,

Shyang Yuh Wang
Research Associate
Pittsburg State University

Appendix B

Invitation Letter

Name
Address

Date: April 18, 2006

Dear Mr./Ms.,

I am a doctoral candidate in the Career and Technical Education program at the University of Missouri-Columbia. For my dissertation research, I will be utilizing a panel of experts in the field of graphic communications to identify significant competencies in graphic design.

The purpose of my research is to obtain consensus from a panel of experts in identifying the essential competencies in graphic communications, specifically graphic design. The panel of experts will be composed of industry representatives and educators.

Members of a Delphi Technique panel are generally recognized and nominated by professional organizations. You have been nominated as an expert in the graphic communications field. Therefore, I am writing to you to ask you to serve on the panel.

If you are willing to participate, you will need to complete four rounds of questionnaires. The first three rounds will be utilized to get consensus on the significant competencies in graphic design. The fourth round will be used to identify the competencies needed for employment. The results of this study will provide recommendations for graphic design curriculum development and instruction design. Each round of questionnaires will take approximately 10 minutes to complete.

If you agree to participate, please let me know by either sending a message via e-mail, or completing and returning the enclosed form in the self-addressed envelope. Thank you for considering this request. Should you have any questions, please contact me at (620)235-4340 or sw976@missouri.edu. Also, my advisor Dr. Bob Stewart can be reached at (573)882-9689 or stewartb@missouri.edu.

Sincerely,

Shyang-Yuh Wang
Research Associate, Pittsburg State University
Doctoral Candidate, University of Missouri-Columbia

Appendix C

Consent Form

INFORMED CONSENT

Shyang Yuh Wang

Identification of the Significant Competencies in Graphic Design

Career and Technical Education

University of Missouri-Columbia

I am conducting a study that involves research. The purpose of this research project is to obtain consensus from a panel of experts in identifying the essential competencies in graphic communications, specifically graphic design, and I expect the duration of your participation to be 10 minutes each time for four rounds. The expected duration of this research will be approximately two months. Below is a description of the procedures that will be followed along with information about any procedures:

1. There are no reasonably foreseeable risks or discomforts that might occur as a result of your participation in this research project.
2. The benefits to you or to others that may reasonably be expected from the research are:
   (1) the results will be shared with participants, and can be used for curriculum development;
   (2) recommendations on graphic design curriculum development.
3. All questionnaires are coded; however, the responses will be kept confidential. The researcher will not share the completed questionnaires with other.
4. Please understand that your participation is voluntary, your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled, and you may discontinue your participation at any time without penalty or loss of benefits. Also, you do not have to answer any questions that may be asked.

To confirm your participation, please complete and return the enclosed form to me in the self-addressed envelope, or sending a message via e-mail. Should you have any questions, please contact myself, Dr. Bob Stewart, or the IRB Compliance Office at:

Shyang Yuh Wang
Doctoral Candidate, University of Missouri-Columbia
Research Associate, Pittsburg State University
S209 Kansas Technology Center
Pittsburg, KS 66762
Tel: (620)235-4340; Fax: (620)235-4343
sw976@missouri.edu

Dr. Bob Stewart, Professor
Career and Technical Education
University of Missouri-Columbia
Tel: (573)882-9689
stewartb@missouri.edu

Campus Institutional Review Board
483 McReynolds
University of Missouri-Columbia
Columbia, MO 65211
Tel: (573)882-9585; Fax: (573)884-0663
umcresearchcirb@missouri.edu

* Please keep this letter for your records.

* Please detach, complete and return the following form.

Dear Mr./Ms.

Thank you for considering this request. If you agree to participate, please let me know by wither completing and returning this form in the self-addressed envelop, or sending a message via e-mail.

☐ Yes, I agree to participate in this study.

☐ No, I do not want to participate in this study.

Your Contact Information

Name: Mr./Ms.
Organization: Name of Organization
Address: Street Address
City: City, State Zip
e-mail:_____

Change of Information

Name:_____
Address:_____
City, State, Zip:_____
e-mail address:_____

Appendix D

Cover Letter for the First-round Questionnaire

Name
Address

Date:

Dear Mr./Ms.,

Thank you for agreeing to serve on the panel to identify the significant competencies in graphic design. I am sending you the “First Round” survey instrument. Please complete and return the instrument by July 28, 2006. You may fax it to me at (620)235-4413 or return it to me in the enclosed envelope.

After I have received all the panel members’ responses, I will analyze them and return them to you for “Second Round” rating. Items are rated on a 1 to 7 scale from extremely undesirable to extremely desirable. Comments can also be included with your rating. You can add new competencies, which you feel necessary to be included. All questionnaires are coded; however, your responses will be kept confidential. The final results will be shared with participants.

Again, thank you for your cooperation. Please do not hesitate to contact me directly should you have any questions or need assistance!

Sincerely,

Shyang-Yuh Wang
Research Associate, Pittsburg State University
Doctoral Candidate, University of Missouri-Columbia

Appendix E

First-round Questionnaire

Competencies in Graphic Design
First Round Instrument

This instrument is intended to identify the significant competencies in Graphic Design. Your participation is deeply appreciated. Please return by mail or fax by July 28, 2006

Please rate each of the statements on a scale of 1-7 by circling the numbers. The scale is as the following:

1 -- Extremely Undesirable (EU) **2 -- Undesirable (UD)** **3 -- Somewhat Undesirable(SU)**
4 -- No Opinion (NO)
5 -- Somewhat Desirable (SD) **6 -- Desirable (D)** **7 -- Extremely Desirable (ED)**

1. **Understand the history of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
2. **Apply sales promotion techniques for advertisement and marketing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
3. **Determine the costs associated with graphic design and other creative service.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
4. **Explain and evaluate customer service issues.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
5. **Apply the principles of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
6. **Apply the concepts of typography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
7. **Apply basic knowledge of Gestalt psychology to graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
8. **Apply the basics of graphic design for multimedia.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
9. **Apply the basics of graphic design for print production.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
10. **Apply the basics of graphic design for webpage development.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
11. **Apply the basics of photography for graphic design purposes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

12. **Perform graphic design creatively.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
13. **Prepare digital documents.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
14. **Apply the techniques of color management.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
15. **Apply the techniques of digital prepress.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
16. **Apply the techniques of photographic lighting.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
17. **Apply the techniques of photography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
18. **Apply the techniques of screen printing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
19. **Apply the techniques of using drawing software**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
20. **Apply the techniques of using multimedia creation software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
21. **Apply the techniques of using page layout and publishing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
22. **Apply the techniques of using image editing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
23. **Apply the techniques of using webpage development software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
24. **Write clearly, concisely, and correctly.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

Please list any other competencies that should be considered.

25.

Comments:

26.

Comments:

27.

Comments:

28.

Comments:

29.

Comments:

30.

Comments:

31.

Comments:

32.

Comments:

33.

Comments:

34.

Comments:

35.

Comments:

Thank you for your time. Should you have any questions, please contact myself, Dr. Bob Stewart, or the IRB Compliance Office at:

Shyang Wang,
Doctoral candidate, University of Missouri-Columbia
Research Associate, Pittsburg State University
S209 Kansas Technology Center
Pittsburg, KS 66762
Tel: (620)235-4340
Fax: (620)235-4343
sw976@missouri.edu

Dr. Bob Stewart, Professor
Career and Technical Education
University of Missouri-Columbia
Tel: (573)882-9689
stewartb@missouri.edu

Campus Institutional Review Board
483 McReynolds
University of Missouri-Columbia
Columbia, MO 65211
Tel: (573)882-9585
Fax: (573)884-0663

Appendix F

Cover Letter for the Second-round Questionnaire

Name
Address

Date:

Dear Mr./Ms.,

Thank you for continued support to identify the significant competencies in graphic design. I am sending you the “Second Round” survey instrument. Please complete and return the instrument by August 14, 2006. You may fax it to me at (620)235-4413 or return it to me in the enclosed envelope.

Many new competencies were identified by the panel, and those have been included in the questionnaire. The “second round” will be the last opportunity for you to add new competencies. After I have received the panel members’ responses, I will analyze them and return them to you for “Third Round” rating. Items are rated on a 1 to 7 scale from extremely undesirable to extremely desirable. Comments can also be included with your rating.

Again, thank you for your continuing cooperation. Please do not hesitate to contact me at swang@pittstate.edu should you have any questions or need assistance!

Sincerely,

Shyang-Yuh Wang
Research Associate, Pittsburg State University
Doctoral Candidate, University of Missouri-Columbia

Appendix G

Second-round Questionnaire

Competencies in Graphic Design
Second Round Instrument

This instrument is intended to identify the significant competencies in Graphic Design. Your participation is deeply appreciated. Please return by mail or fax by August 14, 2006.

Please rate each of the statements on a scale of 1-7 by circling the numbers. The scale is as the following:

1 -- Extremely Undesirable (EU) **2 -- Undesirable (UD)** **3 -- Somewhat Undesirable(SU)**
4 -- No Opinion (NO)
5 -- Somewhat Desirable (SD) **6 -- Desirable (D)** **7 -- Extremely Desirable (ED)**

1. **Understand the history of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
2. **Understand the history of graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
3. **Understand the history of art.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
4. **Apply sales promotion techniques for advertisement and marketing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
5. **Determine the costs associated with graphic design and other creative service.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
6. **Comprehend ethical behaviors in design professions.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
7. **Apply the concepts of economics in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
8. **Apply the theory and practice in E-commerce.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
9. **Apply the concepts of basic marketing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
10. **Apply the theory and practice of basic finance.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
11. **Explain and evaluate customer service issues.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
12. **Apply the principles of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

13. **Apply design concepts.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
14. **Apply the concepts of typography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
15. **Apply the techniques of postscript output.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
16. **Apply basic knowledge of Gestalt psychology to graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
17. **Apply the understanding basic journalism.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
18. **Explain the properties of paper, and its distribution and manufacturing processes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
19. **Apply the theory and practice of basic finance for "small business".**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
20. **Comprehend the terms used in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
21. **Apply the basics of graphic design for multimedia.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
22. **Apply the basics of graphic design for print production.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
23. **Apply the basics of graphic design for webpage development.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
24. **Apply the basics of photography for graphic design purposes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
25. **Perform graphic design creatively.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
26. **Apply the techniques of PDF workflow.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
27. **Apply the understanding of printing mechanics.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
28. **Apply the understanding of graphic communications trends.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

29. **Apply the concepts of packaging technology.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
30. **Apply the theories of organization and management.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
31. **Perform conceptual thinking and ability.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
32. **Apply the concepts of public relations and mass communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
33. **Apply the concepts of technical communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
34. **Apply the concepts of crossmedia publishing and document repurposing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
35. **Prepare digital documents.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
36. **Apply the techniques of color management.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
37. **Apply the understanding of business law and copyright issues.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
38. **Apply basic knowledge of mathematics.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
39. **Apply the techniques of digital prepress.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
40. **Apply the techniques of photographic lighting.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
41. **Apply the techniques of photography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
42. **Apply the techniques of screen printing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
43. **Apply the techniques of drawing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
44. **Apply the techniques of 3-D software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
45. **Apply the techniques of multimedia creation software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

46. **Apply the techniques of page layout and publishing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
47. **Apply the techniques of image editing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
48. **Apply the techniques of webpage development software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
49. **Perform clear and concise verbal and written communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
50. **Apply the techniques of filmmaking.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
51. **Apply the techniques of research methods.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
52. **Apply the techniques of drawing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
53. **Apply the concepts of problem solving.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
54. **Desire to improve and clarify.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
55. **Be able to teach or convey an idea, feeling and belief.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
56. **Be able to learn and comprehend.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
57. **Comprehend the basics of art appreciation.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
58. **Comprehend the importance of awareness of issues, history and culture.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
59. **Apply the techniques of digital scanning.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
60. **Investigate careers in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

Please list any other competencies that should be considered.

61.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

62.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
63.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
64.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
65.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
66.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
67.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
68.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
69.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							
70.	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
Comments:							

Thank you for your time. Should you have any questions, please contact myself, Dr. Bob Stewart, or the IRB Compliance Office at:

Shyang Wang,
Doctoral candidate, University of Missouri-Columbia
Research Associate, Pittsburg State University
S209 Kansas Technology Center
Pittsburg, KS 66762
Tel: (620)235-4340
Fax: (620)235-4343
sw976@missouri.edu

Dr. Bob Stewart, Professor
Career and Technical Education
University of Missouri-Columbia
Tel: (573)882-9689
stewartb@missouri.edu

Campus Institutional Review Board
483 McReynolds
University of Missouri-Columbia
Columbia, MO 65211
Tel: (573)882-9585
Fax: (573)884-0663

Appendix H

Cover Letter for the Third-round and Fourth-round Round Questionnaires

Name
Address

Date:

Dear Mr./Ms.,

Thank you for continued support to identify the significant competencies in graphic design. I am sending you the “Third Round and Fourth Round” survey instrument. Please complete and return the instrument by August 31, 2006. You may fax it to me at (620)235-4413 or return it to me in the enclosed business reply envelope.

This is the final stage to identify competencies in graphic design. You should not add new competencies. In the "Competencies in Graphic Design" survey instrument, items are rated on a 1 to 7 scale from *extremely undesirable* to *extremely desirable*. The results of this survey instrument will provide recommendations for graphic design curriculum development and instruction design.

For the "Competencies for Employment" survey instrument, please choose *up to twenty* competencies you think most needed for employment in today's industry. This instrument will identify the competencies most needed for employment in the graphic design industry. Those competencies could be listed as job requirements for new employees.

Again, thank you for your continued cooperation. Please do not hesitate to contact me at sw976@missouri.edu should you have any questions or need assistance!

Sincerely,

Shyang-Yuh Wang
Research Associate, Pittsburg State University
Doctoral Candidate, University of Missouri-Columbia

Appendix I

Third-round Questionnaire

Competencies in Graphic Design

Third Round Instrument

This instrument is intended to identify the significant competencies in Graphic Design. Your participation is deeply appreciated. Please return by mail or fax by August 31, 2006.

Please rate each of the statements on a scale of 1-7 by circling the numbers. The scale is as the following:

1 -- Extremely Undesirable (EU) **2 -- Undesirable (UD)** **3 -- Somewhat Undesirable(SU)**
4 -- No Opinion (NO)
5 -- Somewhat Desirable (SD) **6 -- Desirable (D)** **7 -- Extremely Desirable (ED)**

1. **Understand the history of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
2. **Understand the history of graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
3. **Understand the history of art.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
4. **Apply sales promotion techniques for advertisement and marketing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
5. **Determine the costs associated with graphic design and other creative service.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
6. **Comprehend ethical behaviors in design professions.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
7. **Apply the concepts of economics in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
8. **Apply the theory and practice in E-commerce.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
9. **Apply the concepts of basic marketing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
10. **Apply the theory and practice of basic finance.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
11. **Explain and evaluate customer service issues.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
12. **Apply the principles of graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
13. **Apply design concepts.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
14. **Apply the concepts of typography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						

15. **Apply the techniques of postscript output.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
16. **Apply basic knowledge of Gestalt psychology to graphic design.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
17. **Apply the understanding of basic journalism.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
18. **Explain the properties of paper, and its distribution and manufacturing processes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
19. **Apply the theory and practice of basic finance for "small business".**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
20. **Comprehend the terms used in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
21. **Apply the basics of graphic design for multimedia.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
22. **Apply the basics of graphic design for print production.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
23. **Apply the basics of graphic design for webpage development.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
24. **Apply the basics of photography for graphic design purposes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
25. **Perform graphic design creatively.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
26. **Apply the techniques of PDF workflow.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
27. **Apply the understanding of printing mechanics.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
28. **Apply the understanding of graphic communications trends.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
29. **Apply the concepts of packaging technology.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
30. **Apply the theories of organization and management.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
31. **Perform conceptual thinking and ability.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
32. **Apply the concepts of public relations and mass communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
33. **Apply the concepts of technical communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						

34. **Apply the concepts of crossmedia publishing and document repurposing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
35. **Prepare digital documents.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
36. **Apply the techniques of color management.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
37. **Apply the understanding of business law and copyright issues.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
38. **Apply basic knowledge of mathematics.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
39. **Apply the techniques of digital prepress.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
40. **Apply the techniques of photographic lighting.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
41. **Apply the techniques of photography.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
42. **Apply the techniques of screen printing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
43. **Apply the techniques of drawing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
44. **Apply the techniques of 3-D software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
45. **Apply the techniques of multimedia creation software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
46. **Apply the techniques of page layout and publishing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
47. **Apply the techniques of image editing software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
48. **Apply the techniques of webpage development software.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
49. **Perform clear and concise verbal and written communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
50. **Apply the techniques of filmmaking.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
51. **Apply the techniques of research methods.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
52. **Apply the techniques of drawing.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
53. **Apply the concepts of problem solving.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						

54. **Desire to improve and clarify.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
55. **Be able to teach or convey an idea, feeling and belief.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
56. **Be able to learn and comprehend.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
57. **Comprehend the basics of art appreciation.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
58. **Comprehend the importance of awareness of issues, history and culture.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
59. **Apply the techniques of digital scanning.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
60. **Investigate careers in graphic communications.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
61. **Apply the techniques of information and internet searching.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
62. **Understand web processes and protocols.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
63. **Apply the techniques of preparing portfolios.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
64. **Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
65. **Understand how paper/substrates affect printed images.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						
66. **Understand how the grain and composition of paper affect finishing processes.**	1	2	3	4	5	6	7
	EU	UD	SU	NO	SD	D	ED
	Undesirable ---------- Desirable						

Thank you for your time. Should you have any questions, please contact myself, Dr. Bob Stewart, or the IRB Compliance Office at:

Shyang Wang,
Doctoral candidate, University of Missouri-Columbia
Research Associate, Pittsburg State University
S209 Kansas Technology Center
Pittsburg, KS 66762
Tel: (620)235-4340
Fax: (620)235-4343
sw976@missouri.edu

Dr. Bob Stewart, Professor
Career and Technical Education
University of Missouri-Columbia
Tel: (573)882-9689
stewartb@missouri.edu

Campus Institutional Review Board
483 McReynolds
University of Missouri-Columbia
Columbia, MO 65211
Tel: (573)882-9585
Fax: (573)884-0663

Appendix J

Fourth-round Questionnaire

Competencies for Employment

Please choose “up to twenty” competencies most needed for "employment" in today's graphic design industry. Please return by mail or fax by August 31, 2006. Thank you.

[ ]	1. Understand the history of graphic design.
[ ]	2. Understand the history of graphic communications.
[ ]	3. Understand the history of art.
[ ]	4. Apply sales promotion techniques for advertisement and marketing.
[ ]	5. Determine the costs associated with graphic design and other creative service.
[ ]	6. Comprehend ethical behaviors in design professions.
[ ]	7. Apply the concepts of economics in graphic communications.
[ ]	8. Apply the theory and practice in E-commerce.
[ ]	9. Apply the concepts of basic marketing.
[ ]	10. Apply the theory and practice of basic finance.
[ ]	11. Explain and evaluate customer service issues.
[ ]	12. Apply the principles of graphic design.
[ ]	13. Apply design concepts.
[ ]	14. Apply the concepts of typography.
[ ]	15. Apply the techniques of postscript output.
[ ]	16. Apply basic knowledge of Gestalt psychology to graphic design.
[ ]	17. Apply the understanding of basic journalism.
[ ]	18. Explain the properties of paper, and its distribution and manufacturing processes.
[ ]	19. Apply the theory and practice of basic finance for “small business”.
[ ]	20. Comprehend the terms used in graphic communications.
[ ]	21. Apply the basics of graphic design for multimedia.
[ ]	22. Apply the basics of graphic design for print production.
[ ]	23. Apply the basics of graphic design for webpage development.
[ ]	24. Apply the basics of photography for graphic design purposes.
[ ]	25. Perform graphic design creatively.
[ ]	26. Apply the techniques of PDF workflow.
[ ]	27. Apply the understanding of printing mechanics.
[ ]	28. Apply the understanding of graphic communications trends.
[ ]	29. Apply the concepts of packaging technology.
[ ]	30. Apply the theories of organization and management.
[ ]	31. Perform conceptual thinking and ability.
[ ]	32. Apply the concepts of public relations and mass communications.
[ ]	33. Apply the concepts of technical communications.
[ ]	34. Apply the concepts of crossmedia publishing and document repurposing.
[ ]	35. Prepare digital documents.
[ ]	36. Apply the techniques of color management.
[ ]	37. Apply the understanding of business law and copyright issues.
[ ]	38. Apply basic knowledge of mathematics.
[ ]	39. Apply the techniques of digital prepress.
[ ]	40. Apply the techniques of photographic lighting.
[ ]	41. Apply the techniques of photography.
[ ]	42. Apply the techniques of screen printing.

[ ]	43. Apply the techniques of drawing software.
[ ]	44. Apply the techniques of 3-D software.
[ ]	45. Apply the techniques of multimedia creation software.
[ ]	46. Apply the techniques of page layout and publishing software.
[ ]	47. Apply the techniques of image editing software.
[ ]	48. Apply the techniques of webpage development software.
[ ]	49. Perform clear and concise verbal and written communications.
[ ]	50. Apply the techniques of filmmaking.
[ ]	51. Apply the techniques of research methods.
[ ]	52. Apply the techniques of drawing.
[ ]	53. Apply the concepts of problem solving.
[ ]	54. Desire to improve and clarify.
[ ]	55. Be able to teach or convey an idea, feeling and belief.
[ ]	56. Be able to learn and comprehend.
[ ]	57. Comprehend the basics of art appreciation.
[ ]	58. Comprehend the importance of awareness of issues, history and culture.
[ ]	59. Apply the techniques of digital scanning.
[ ]	60. Investigate careers in graphic communications.
[ ]	61. Apply the techniques of information and internet searching.
[ ]	62. Understand web processes and protocols.
[ ]	63. Apply the techniques of preparing portfolios.
[ ]	64. Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design
[ ]	65. Understand how paper/substrates affect printed images.
[ ]	66. Understand how the grain and composition of paper affect finishing processes.

Appendix K

Reminding Letter

Name
Address

Date:

Dear Mr./Ms.,

Thank you for your continuing support. I sent you the last questionnaires on August 14; however, I have not received your response. Please complete and return the questionnaires to me at your earliest convenience.

For every Delphi Technique study, a high return response rate is required. Therefore, without your participation, completing this research would become extremely difficult. I am sending you this reminder because your response is very important to this research, and it is valuable for graphic design curriculum development.

If you have returned the questionnaires, please discard this message. Again, thank you for your cooperation. Please do not hesitate to contact me at sw976@missouri.edu should you have any questions or need assistance!

Sincerely,

Shyang-Yuh Wang
Research Associate, Pittsburg State University
Doctoral Candidate, University of Missouri-Columbia

Appendix L

Graphic Design Complete Competency List

Sixty-three desirable competencies in graphic design:

- Understand the history of graphic design.
- Understand the history of graphic communications.
- Understand the history of art.
- Apply sales promotion techniques for advertisement and marketing.
- Determine the costs associated with graphic design and other creative service.
- Comprehend ethical behaviors in design professions.
- Apply the concepts of economics in graphic communications.
- Apply the theory and practice in E-commerce.
- Apply the concepts of basic marketing.
- Apply the theory and practice of basic finance.
- Explain and evaluate customer service issues.
- Apply the principles of graphic design.
- Apply design concepts.
- Apply the concepts of typography.
- Apply the techniques of postscript output.
- Apply basic knowledge of Gestalt psychology to graphic design.
- Apply the understanding of basic journalism.
- Explain the properties of paper, and its distribution and manufacturing processes.
- Comprehend the terms used in graphic communications.
- Apply the basics of graphic design for multimedia.
- Apply the basics of graphic design for print production.
- Apply the basics of graphic design for webpage development.
- Apply the basics of photography for graphic design purposes.
- Perform graphic design creatively.
- Apply the techniques of PDF workflow.
- Apply the understanding of printing mechanics.

- Apply the understanding of graphic communications trends.
- Apply the concepts of packaging technology.
- Apply the theories of organization and management.
- Perform conceptual thinking and ability.
- Apply the concepts of public relations and mass communications.
- Apply the concepts of technical communications.
- Apply the concepts of crossmedia publishing and document repurposing.
- Prepare digital documents.
- Apply the techniques of color management.
- Apply the understanding of business law and copyright issues.
- Apply basic knowledge of mathematics.
- Apply the techniques of digital prepress.
- Apply the techniques of photographic lighting.
- Apply the techniques of photography.
- Apply the techniques of drawing software.
- Apply the techniques of 3-D software.
- Apply the techniques of multimedia creation software.
- Apply the techniques of page layout and publishing software.
- Apply the techniques of image editing software.
- Apply the techniques of webpage development software.
- Perform clear and concise verbal and written communications.
- Apply the techniques of research methods.
- Apply the techniques of drawing.
- Apply the concepts of problem solving.
- Desire to improve and clarify.
- Be able to teach or convey an idea, feeling and belief.
- Be able to learn and comprehend.
- Comprehend the basics of art appreciation.

- Comprehend the importance of awareness of issues, history and culture.
- Apply the techniques of digital scanning.
- Investigate careers in graphic communications.
- Apply the techniques of information and internet searching.
- Understand web processes and protocols.
- Apply the techniques of preparing portfolios.
- Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design
- Understand how paper/substrates affect printed images.
- Understand how the grain and composition of paper affect finishing processes.

Three competencies in graphic design not considered as desirable by panel members:

- Apply the theory and practice of basic finance for “small business”.
- Apply the techniques of screen printing.
- Apply the techniques of filmmaking.

Appendix M

Thirty-six Graphic Design Competencies Identified at the First-round

Fifteen graphic design competencies identified by the educators at the first-round:

7. Apply the concepts of economics in graphic communications.

8. Apply the theory and practice in E-commerce.

10. Apply the theory and practice of basic finance.

15. Apply the techniques of postscript output.

19. Apply the theory and practice of basic finance for “small business”.

26. Apply the techniques of PDF workflow.

29. Apply the concepts of packaging technology.

30. Apply the theories of organization and management.

31. Perform conceptual thinking and ability.

33. Apply the concepts of technical communications.

34. Apply the concepts of crossmedia publishing and document repurposing.

37. Apply the understanding of business law and copyright issues.

44. Apply the techniques of 3-D software.

51. Apply the techniques of research methods.

59. Apply the techniques of digital scanning.

Twenty-one graphic design competencies identified by the industry representatives at the first-round:

2. Understand the history of graphic communications.

3. Understand the history of art.

6. Comprehend ethical behaviors in design professions.

9. Apply the concepts of basic marketing.

17. Apply the understanding of basic journalism.

18. Explain the properties of paper, and its distribution and manufacturing processes.

20. Comprehend the terms used in graphic communications.

24. Apply the basics of photography for graphic design purposes.

27. Apply the understanding of printing mechanics.

28. Apply the understanding of graphic communications trends.

32. Apply the concepts of public relations and mass communications.

38. Apply basic knowledge of mathematics.

50. Apply the techniques of filmmaking.

52. Apply the techniques of drawing.

53. Apply the concepts of problem solving.

54. Desire to improve and clarify.

55. Be able to teach or convey an idea, feeling and belief.

56. Be able to learn and comprehend.

57. Comprehend the basics of art appreciation.

58. Comprehend the importance of awareness of issues, history and culture.

60. Investigate careers in graphic communications.

Appendix N

Six Graphic Design Competencies Identified at the Second-round

Graphic design competencies identified by the industry representatives at the second-round:

61. Apply the techniques of information and internet searching.
62. Understand web processes and protocols.
63. Apply the techniques of preparing portfolios.
64. Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design
65. Understand how paper/substrates affect printed images.
66. Understand how the grain and composition of paper affect finishing processes.

* The educators did not identify any competencies at the second-round.

Appendix O

Most Essential Competencies Perceived by the Educators and Industry Representatives

The most essential competencies in graphic design perceived by the educators and industry representatives.

Item Number	Competency	Educator *Mean* n=11	Industry Rep. *Mean* n=17
25	Perform graphic design creatively	6.91	6.76
12	Apply the principles of graphic design	6.82	6.71
53	Apply the concepts of problem solving	6.82	6.47
13	Apply design concepts	6.73	6.53
46	Apply the techniques of page layout and publishing software.	6.73	5.94
14	Apply the concepts of typography.	6.64	6.41
49	Perform clear and concise verbal and written communications.	6.64	6.41
54	Desire to improve and clarify.	6.64	6.53
22	Apply the basics of graphic design for print production.	6.63	6.65
31	Perform conceptual thinking and ability.	6.55	6.12
47	Apply the techniques of image editing software.	6.55	5.88
56	Be able to learn and comprehend.	6.55	6.65

Other essential competencies perceived by the industry representatives:

20. Comprehend the terms used in graphic communications (*M* = 6.53)
43. Apply the techniques of drawing software (*M* = 6.65)

Appendix P

Competencies for Employment in Today's Graphic Design Industry

The competencies needed for employment in today's graphic design industry.

Competency	Frequency		
	Educator n=11	Industry n=17	Total N=28
1. Understand the history of graphic design.	1	1	2
2. Understand the history of graphic communications.	1	2	3
3. Understand the history of art.	0	2	2
4. Apply sales promotion techniques for advertisement and marketing.	3	4	7
5. Determine the costs associated with graphic design and other creative service.	8	7	15
6. Comprehend ethical behaviors in design professions.	4	4	8
7. Apply the concepts of economics in graphic communications.	2	3	5
8. Apply the theory and practice in E-commerce.	1	1	2
9. Apply the concepts of basic marketing.	2	4	6
10. Apply the theory and practice of basic finance.	1	1	2
11. Explain and evaluate customer service issues.	1	6	7
12. Apply the principles of graphic design.	11	13	24
13. Apply design concepts.	4	9	13
14. Apply the concepts of typography.	8	9	17
15. Apply the techniques of postscript output.	0	2	2
16. Apply basic knowledge of Gestalt psychology to graphic design.	0	0	0
17. Apply the understanding of basic journalism.	1	0	1
18. Explain the properties of paper, and its distribution and manufacturing processes.	2	0	2
19. Apply the theory and practice of basic finance for "small business".	0	1	1
20. Comprehend the terms used in graphic communications.	6	7	13
21. Apply the basics of graphic design for multimedia.	6	5	11
22. Apply the basics of graphic design for print production.	10	10	20
23. Apply the basics of graphic design for webpage development.	8	10	18

Competency	Frequency		
	Educator n=11	Industry n=17	Total N=28
24. Apply the basics of photography for graphic design purposes.	3	7	10
25. Perform graphic design creatively.	5	12	17
26. Apply the techniques of PDF workflow.	6	3	9
27. Apply the understanding of printing mechanics.	1	4	5
28. Apply the understanding of graphic communications trends.	1	3	4
29. Apply the concepts of packaging technology.	0	0	0
30. Apply the theories of organization and management.	0	1	1
31. Perform conceptual thinking and ability.	8	8	16
32. Apply the concepts of public relations and mass communications.	0	0	0
33. Apply the concepts of technical communications.	0	0	0
34. Apply the concepts of crossmedia publishing and document repurposing.	1	4	5
35. Prepare digital documents.	3	7	10
36. Apply the techniques of color management.	4	6	10
37. Apply the understanding of business law and copyright issues.	4	2	6
38. Apply basic knowledge of mathematics.	3	1	4
39. Apply the techniques of digital prepress.	1	8	9
40. Apply the techniques of photographic lighting.	2	2	4
41. Apply the techniques of photography.	3	2	5
42. Apply the techniques of screen printing.	0	0	0
43. Apply the techniques of drawing software.	3	6	9
44. Apply the techniques of 3-D software.	0	1	1
45. Apply the techniques of multimedia creation software.	6	3	9
46. Apply the techniques of page layout and publishing software.	9	10	19
47. Apply the techniques of image editing software.	8	5	13
48. Apply the techniques of webpage development software.	3	6	9

Competency	Frequency		
	Educator n=11	Industry n=17	Total N=28
49. Perform clear and concise verbal and written communications.	6	8	14
50. Apply the techniques of filmmaking.	0	0	0
51. Apply the techniques of research methods.	2	2	4
52. Apply the techniques of drawing.	2	3	5
53. Apply the concepts of problem solving.	10	8	18
54. Desire to improve and clarify.	6	7	13
55. Be able to teach or convey an idea, feeling and belief.	7	5	12
56. Be able to learn and comprehend.	9	10	19
57. Comprehend the basics of art appreciation.	0	0	0
58. Comprehend the importance of awareness of issues, history and culture.	2	1	3
59. Apply the techniques of digital scanning.	0	2	2
60. Investigate careers in graphic communications.	0	1	1
61. Apply the techniques of information and internet searching.	1	4	5
62. Understand web processes and protocols.	2	1	3
63. Apply the techniques of preparing portfolios.	4	1	5
64. Understand the difference between the disciplines of architecture/interior design/industrial design as it relates to graphic design	0	2	2
65. Understand how paper/substrates affect printed images.	1	3	4
66. Understand how the grain and composition of paper affect finishing processes.	1	3	4

Appendix Q

Most Needed Competencies for Employment in Today's Graphic Design Industry

- Apply the principles of graphic design.
- Apply the basics of graphic design for print production.
- Apply the techniques of page layout and publishing software.
- Be able to learn and comprehend.
- Apply the basics of graphic design for webpage development.
- Apply the concepts of problem solving.
- Apply the concepts of typography.
- Perform graphic design creatively.
- Perform conceptual thinking and ability.
- Determine the costs associated with graphic design and other creative service.
- Perform clear and concise verbal and written communications.
- Apply design concepts.
- Comprehend the terms used in graphic communications.
- Apply the techniques of image editing software.
- Desire to improve and clarify.
- Be able to teach or convey an idea, feeling and belief.
- Apply the basics of graphic design for multimedia.
- Apply the basics of photography for graphic design purposes.
- Prepare digital documents.
- Apply the techniques of color management.

Appendix R

Panel Composition

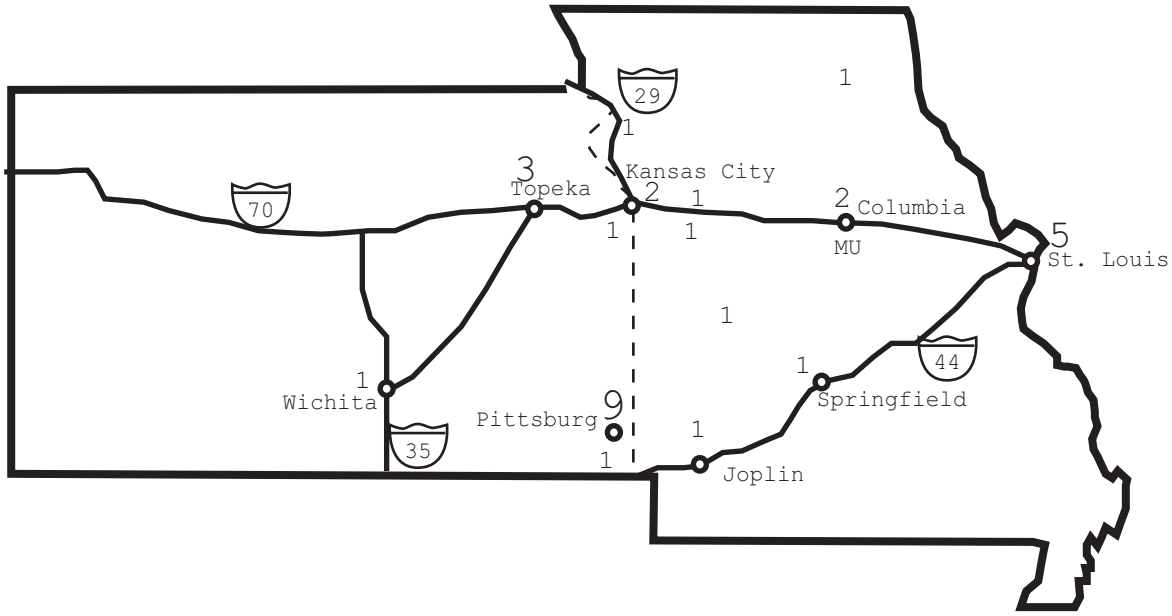
Panel Composition

Kansas

Number of Experts	City
9	Pittsburg
3	Topeka
1	Wichita
1	Mission
1	Parsons

Missouri

Number of Experts	City
5	St. Louis
2	Columbia
2	Kansas City
1	Joplin
1	Lee Summit
1	Ray Town
1	Warrensburg
1	Kirksville
1	St. Joseph



VITA

Shyang-Yuh Wang was born on April 18, 1975, in Taipei City, Taiwan. He came to the U.S. for college and higher degrees in 1995.

He received a Bachelor of Science degree in engineering technology in 2000; Master of Science degree in Technology in 2000; and Specialist in Education degree in industrial education in 2002 from Pittsburg State University.

After the completion of all doctoral coursework, he received a post-doc research associateship at Pittsburg State University in October 2004. The research topic was the Multifunctional Materials for Naval Structures. He completed requirements for the Ph.D. degree in Career and Technical Education at the University of Missouri-Columbia in December 2006.