DEMOCRATIZING KNOWLEDGE
through
PRINT

Visual Communications JOURNAL

GRAPHIC COMMUNICATIONS EDUCATION ASSOCIATION

FALL 2016

Acknowledgements

About the Journal

The *Visual Communications Journal* serves as the official journal of the Graphic Communications Education Association, and provides a professional communicative link for educators and industry personnel associated with design, presentation, management, and reproduction of graphic forms of communication. Manuscripts submitted for publication are subject to peer review. The views and opinions expressed herein are those of authors and do not necessarily reflect the policy or the views of the GCEA.

Article Submission

Please follow the guidelines provided at the back of this *Journal*.

Membership and Subscription Information

Information about membership in the Association or subscription to the *Journal* should be directed to the GCEA First Vice-President.

Reference Sources

The *Visual Communications Journal* can be found on EBSCOHost databases.
ISSN: Print: 0507-1658 Web: 2155-2428

Skills, Content Knowledge, and Tools Needed in a 21st Century University-Level Graphic Design Program

by Amanda W. Bridges, Ed.D. • Gardner-Webb University

Introduction

Graphic design educators in higher education should ask themselves, "do my students have the skills and content knowledge needed for success in the graphic design field today?" Davis' (2005) essay entitled *Raising the Bar for Higher Education* stated that in previous years expectations regarding graphic design education were relatively clear. However, over the last few decades conditions have changed. The large number of university-level graphic design programs and concentrations and the inability to track graduates from those programs has led to inconsistencies in the curriculum (Heller, 2005). Identification of skills and competencies is of particular importance in a program that is not accredited by the National Association of Schools of Art and Design (NASAD).

In addition, as technology trends continue to emerge and evolve, one must wonder if new tools are impacting what is expected of graphic design alumni when entering the workforce. These questions were the driving force for this study. The most appropriate context for applying these findings would be in university-level graphic design programs where accreditation by NASAD is either not applicable or not possible. This research provides a framework for educators to develop or evaluate an effective graphic design curriculum based on what participants of the study found to be most important. This study examined views from both educators at university-level institutions as well as industry professionals in order to encourage a consensus among experts, and was an expansion of a former study conducted by Shyang Yuh-Wang in 2006.

Instruments and Procedures

The study used a modified Delphi Technique, which has often been used in educational research (Judd, 1972; Rowe & Wright, 1999). Participants who committed to the study included 18 university-level educators with full-time teaching appointments in the area of graphic design and 25 industry professionals currently employed in the graphic design field. The same subjects participated in all rounds of the study.

The instrument used for the first-round survey of this research study was a questionnaire originally developed by Wang for his 2006 study. Since this study was an expansion of Wang's (2006) study, the previously devel-oped questionnaire was applicable. The original questionnaire was created by Wang based on a review of literature as well as in consultation with three experts in the graphic design field. Lunkenheimer (2002) discussed that the use of a modified Delphi in which participants are given a list of competencies in the first round of questioning, rather than being asked to develop the list, leads to a lower participant dropout rate. The questionnaire prompted participants to rank competencies based on importance using a Likert scale in which seven is the highest possible ranking score on the Likert scale. Participants were also given the opportunity to provide comments regarding each skill, content knowledge, and tool; and to provide opinions in the round one questionnaire.

The round two questionnaire was based on responses from round one and instructed participants to, again, rank competencies using a Likert scale ranging from one to seven. As with the round one questionnaire, participants were able to provide comments and opinions. Both rounds one and two questionnaires also allowed for participants to list any additional competencies that may not be included on the questionnaires. The third-round questionnaire was completely quantitative in nature and prompted participants to simply rank each previously identified skill, content knowledge, and tool using the same Likert scale from one to seven (seven being extremely desirable). Round three survey questions were, again, based on results from round two. The fourth and final questionnaire instructed experts to rank the top 20 most desired 21st century skills, content knowledge, and tools required for a successful university-level graphic design program. The goal of round three was to determine the importance of each identified skill, content knowledge, and tool. The goal of round four was to identify the 20 most important competencies and was used to gain a clearer consensus.

Riggs (1983) addressed the many extensions and modifications of the Delphi. Procedures for conducting and analyzing the collected data from rounds one, two, three, and four were similar to those used by Wang in his 2006 study. Wang utilized a modified Delphi Technique as the primary research method and administered four separate questionnaires to be completed by participants; each questionnaire building upon answers received from the

previous. This current study also utilized a modified Delphi Technique consisting of four rounds of surveying.

Descriptive statistics were used to analyze the quantitative data. The mean and standard deviation of all scores was determined. The median was calculated to determine a more reliable measure of central tendency and to take into account any outliers. Finally, the mode was calculated in order to determine frequency. Data results from round one were used to create survey questions to be included in round two, and so on. The Statistical Package for the Social Sciences (SPSS) was used to generate the descriptive statistics. Coding was used to analyze the qualitative data, which was only necessary for rounds one and two of the questionnaire, as rounds three and four were completely quantitative. Therefore, the final results of the study were represented by quantitative findings.

As previously mentioned, the Delphi process requires a series of questionnaires in order to gain a consensus among experts. In order to reach that consensus, questionnaires should build off of the previous versions. Therefore, rounds two, three, and four were developed based on data received from the previous instruments. The goal here is to move participants toward an eventual consensus. The Delphi process uses a convergent parallel design, meaning that data collection and analysis occur simultaneously. It is also important to note that all questionnaires were distributed to participants via the SurveyMonkey software package.

Results

All statements indicated a range of 5.0 to 7.0 for the median score and mode. Standard deviation scores remained at or below 1.4, indicating a normal distribution. All statements in round one received a mean score

Table 1: Round One Descriptive Statistics on the Most Needed Graphic Design Competencies			
1. Understand the history of graphic design.			
Mean = 6.1579	Median = 6.0000	Mode = 7.0000	SD = 1.1514
2. Apply sales promotion techniques for advertising and marketing.			
Mean = 5.5789	Median = 6.0000	Mode = 6.0000	SD = 1.2656
3. Determine the costs associated with graphic design and other creative services.			
Mean = 5.8649	Median = 6.0000	Mode = 6.0000	SD = 1.3158
4. Explain and evaluate customer service issues.			
Mean = 6.0263	Median = 6.0000	Mode = 6.0000	SD = .8216

5. Apply the principles of graphic design.			
Mean = 6.8684	Median = 7.0000	Mode = 7.0000	SD = .3426
6. Apply the concepts of typography.			
Mean = 6.8158	Median = 7.0000	Mode = 7.0000	SD = .3929
7. Apply basic knowledge of Gestalt psychology to graphic design.			
Mean = 5.9189	Median = 6.0000	Mode = 6.0000	SD = .9539
8. Apply the basics of graphic design multimedia.			
Mean = 6.5263	Median = 7.0000	Mode = 7.0000	SD = .6035
9. Apply the basics of graphic design for print production.			
Mean = 6.4474	Median = 7.0000	Mode = 7.0000	SD = .8913
10. Apply the basics of graphic design for webpage development.			
Mean = 6.5676	Median = 7.0000	Mode = 7.0000	SD = .6028
11. Apply the basics of photography for graphic design purposes.			
Mean = 6.1892	Median = 6.0000	Mode = 6.0000	SD = .7393
12. Perform graphic design creatively.			
Mean = 6.7632	Median = 7.0000	Mode = 7.0000	SD = .4896
13. Prepare digital documents.			
Mean = 6.5789	Median = 7.0000	Mode = 7.0000	SD = .6831
14. Apply the techniques of color management.			
Mean = 6.4324	Median = 7.0000	Mode = 7.0000	SD = .6472
15. Apply the techniques of digital prepress.			
Mean = 6.0789	Median = 6.0000	Mode = 7.0000	SD = 1.0751
16. Apply the techniques of photographic lighting.			
Mean = 5.4737	Median = 5.5000	Mode = 5.0000	SD = 1.0064
17. Apply the techniques of photography.			
Mean = 5.8056	Median = 6.000	Mode = 6.0000	SD = .7491
18. Apply the techniques of screen printing.			
Mean = 4.9474	Median = 5.0000	Mode = 5.0000	SD = .9571
19. Apply the techniques of using drawing software.			
Mean = 5.7895	Median =6.0000	Mode = 6.0000	SD = 1.0944
20. Apply the techniques of using multimedia creation software.			
Mean = 5.7105	Median = 6.0000	Mode = 6.0000	SD = 1.2926
21. Apply the techniques of using page layout and publishing software.			
Mean = 6.3684	Median = 7.0000	Mode = 7.0000	SD = 1.4031
22. Apply the techniques of using image editing software.			
Mean = 6.5263	Median = 7.0000	Mode = 7.0000	SD = .9223

23. Apply the techniques of webpage development software.			
Mean = 6.0000	Median = 6.0000	Mode = 7.0000	SD = 1.2019
24. Write clearly, concisely, and correctly.			
Mean = 6.5526	Median = 7.0000	Mode = 7.0000	SD = .7952

[a] n=38
[b] Statements with the highest mean scores, or those closest to seven, are considered most important.

of 4 or better, so all were included in the round two questionnaire. When asked to list any additional statements not previously included in the questionnaire, professionals provided 20 additional competencies. Coding was used to analyze the qualitative data generated from this question. In total, eight new statements were added and two existing statements were modified.

The round one questionnaire also prompted participants to list any tools needed in an effective university-level graphic design program. Sixteen participants added comments to the "Tools" question. Some participants listed more than one tool in each statement. Some comments included "Microsoft Office and Adobe Acrobat," "Adobe software products are an industry standard," and "Ruler, exacto, sketchbook." All comments received in round one were again coded and categorized according to themes and were included in the round two questionnaire. The format for this question in round two prompted participants to select all tools needed, as well as allowed for any additional tools to be added.

Round Two Results

As with round one data, descriptive statistics were again used to analyze the quantitative data from round two. Four of the five highest-ranking competencies from round one were again included in round two. The one exception was "exhibit interpersonal skills," which was a newly added statement based on comments from round one.

Table 2: Round Two Descriptive Statistics on the Most Needed Graphic Design Competencies

1. Understand the history of graphic design.			
Mean = 6.2424	Median = 6.0000	Mode = 6.0000	SD = .7918
*2. Exhibit skills in the foundations of artistic expression (painting, drawing, sculpting).			
Mean = 5.8788	Median = 6.0000	Mode = 6.0000	SD = .9924
3. Apply the principles of graphic design.			
Mean = 6.8750	Median = 7.0000	Mode = 7.0000	SD = .3360
4. Apply the concepts of typography.			
Mean = 6.7879	Median = 7.0000	Mode = 7.0000	SD = .4152
5. Apply basic knowledge of Gestalt psychology to graphic design.			
Mean = 5.9091	Median = 6.0000	Mode = 6.0000	SD = .8791
6. Perform graphic design creatively.			
Mean = 6.7500	Median = 7.0000	Mode = 7.0000	SD = .5080
7. Write clearly, concisely, and correctly.			
Mean = 6.4242	Median = 6.0000	Mode = 7.0000	SD = .6139
*8. Exhibit interpersonal skills (problem solving, curiosity, motivation, innovation, conceptual thinking, communication).			
Mean = 6.8485	Median = 7.0000	Mode = 7.0000	SD = .3641
*9. Exhibit effective presentation skills.			
Mean = 6.4545	Median = 7.0000	Mode = 7.0000	SD = .6170
*10. Knowledge of current communications industry trends (convergence, visual communication, storytelling, videography).			
Mean = 6.1818	Median = 6.0000	Mode = 6.0000	SD = .7687
11. Apply sales promotion techniques for advertising and marketing.			
Mean = 5.5455	Median = 6.0000	Mode = 6.0000	SD = 1.0028
*12. Apply the basics of packaging design.			
Mean = 5.5455	Median = 6.0000	Mode = 6.0000	SD = .7942
13. Determine the costs associated with graphic design and other creative services.			
Mean = 5.7576	Median = 6.0000	Mode = 6.0000	SD = 1.0317
14. Explain and evaluate customer service issues.			
Mean = 5.455	Median = 6.0000	Mode = 6.0000	SD = 1.0923
15. Apply the basics of graphic design for multimedia.			
Mean = 6.2727	Median = 6.0000	Mode = 6.0000	SD = .6742
*16. Apply the basics of graphic design for print production, including knowledge of finishing operations.			
Mean = 6.4848	Median = 7.0000	Mode = 7.0000	SD = .7124
17. Apply the basics of graphic design for webpage development.			
Mean = 6.4848	Median = 7.0000	Mode = 7.0000	SD = .5658
18. Apply the basics of photography for graphic design purposes.			
Mean = 6.3333	Median = 6.0000	Mode = 6.0000	SD = .6455
19 Prepare digital documents.			
Mean = 6.6875	Median = 7.0000	Mode = 7.0000	SD = .5923
*20. Apply the principles and techniques of color theory and management.			
Mean = 6.4545	Median = 7.0000	Mode = 7.0000	SD = .6170

21. Apply the techniques of digital prepress.			
Mean = 6.3030	Median = 7.0000	Mode = 7.0000	SD = 1.1035
22. Apply the techniques of photographic lighting.			
Mean = 5.6875	Median = 6.0000	Mode = 6.0000	SD = .8958
23. Apply the techniques of photography.			
Mean = 5.8788	Median = 6.0000	Mode = 6.0000	SD = .8200
24. Apply the techniques of screen printing.			
Mean = 4.9394	Median = 5.0000	Mode = 5.0000	SD = .8269
25. Apply the techniques of using drawing software.			
Mean = 5.9697	Median = 6.0000	Mode = 7.0000	SD = 1.0454
26. Apply the techniques of using multimedia creation software.			
Mean = 6.0000	Median = 6.0000	Mode = 6.0000	SD = 1.1640
27. Apply the techniques of using page layout and publishing software.			
Mean = 6.6061	Median = 7.0000	Mode = 7.0000	SD = .7044
28. Apply the techniques of using image editing software.			
Mean = 6.4848	Median = 7.0000	Mode = 7.0000	SD = .7550
29. Apply the techniques of webpage development software			
Mean = 5.9394	Median = 6.0000	Mode = 6.0000	SD = 1.1440
*30. Apply the techniques of video editing software.			
Mean = 5.5152	Median = 5.0000	Mode = 5.0000	SD = .9395
*31. Apply the techniques of 3D and motion design software.			
Mean = 5.3636	Median = 5.0000	Mode = 6.0000	SD = 1.0553
*32. Apply the techniques of traditional production and drawing tools.			
Mean = 5.6970	Median = 6.0000	Mode = 7.0000	SD = 1.1035

Note *Newly added or modified statements
[a] n=33
[b] Statements with the highest mean scores, or those closest to seven, are considered most important.

In keeping with the Delphi process, round two again prompted participants to list any additional statements not previously mentioned. Twelve of the 33 experts completing round two included new statements. These qualitative data were coded according to themes in the same manner as round one. Round two generated two new statements and three modified statements.

As with round one, round two prompted participants to select all tools needed in an effective university-level graphic design program and to list any additional tools not previously stated in the question. Tools selected as needed by 50% or more of participants included Adobe Photoshop, Adobe Illustrator, Adobe InDesign, Adobe Acrobat, Adobe Dreamweaver, Microsoft Office, scanners, printers, exacto knives, sketchbooks, rulers, and MacBook Pro laptop. Participants included seven new comments related to tools. Those comments were included as new tools in the final question of round three. The researcher of this study concluded that rather than including the previously listed tools again in round three, only those newly identified tools would be added. Round four included all tools selected by 50% or more of participants.

Round Three Results

As with the previous rounds, descriptive statistics were used to analyze the data received from round three. "Apply the techniques of using page layout and publishing software" was a new top five statement, while the other top four remain among the highest ranking throughout all three rounds. Though participants had the option to provide positive or negative comments regarding each statement in round three, experts were not given the opportunity to add any new statements or tools. Round two was the final round in which qualitative data were

Table 3: Round Three Descriptive Statistics on the Most Needed Graphic Design Competencies			
1. Understand the history of graphic design.			
Mean = 6.1290	Median = 6.0000	Mode = 6.0000	SD = .8462
2. Exhibit skills in the foundations of artistic expression (painting, drawing, sculpting).			
Mean = 5.5806	Median = 6.0000	Mode = 6.0000	SD = 1.0886
3. Apply the basic principles of graphic design aesthetics, including composition.			
Mean = 6.8710	Median = 7.0000	Mode = 7.0000	SD = .3408
4. Apply the concepts of typography.			
Mean = 6.8667	Median = 7.0000	Mode = 7.0000	SD = .3458
*5. Apply foundational elements of graphic design, such as creating traditional paper mockups and hand-rendering of type.			
Mean = 5.6129	Median = 6.0000	Mode = 6.0000	SD = 1.1741
6. Apply basic knowledge of Gestalt psychology to graphic design.			
Mean = 5.9032	Median = 6.0000	Mode = 6.0000	SD = .9783
7. Perform graphic design creatively.			
Mean = 6.7742	Median = 7.0000	Mode = 7.0000	SD = .5603
8. Write clearly, concisely, and correctly.			
Mean = 6.4516	Median = 7.0000	Mode = 7.0000	SD = .7229

9. Exhibit interpersonal skills (problem solving, curiosity, motivation, innovation, conceptual thinking, communication).

Mean = 6.7097	Median = 7.0000	Mode = 7.0000	SD = .4614

10. Exhibit effective presentation skills.

Mean = 6.2581	Median = 6.0000	Mode = 6.0000	SD = .7288

11. Knowledge of current communications industry trends (convergence, visual communication, storytelling, videography).

Mean = 6.1935	Median = 6.0000	Mode = 6.0000	SD = .6542

*12. Knowledge of related disciplines (business and marketing, art, psychology, geometry, and physics).

Mean = 5.6129	Median = 6.0000	Mode = 6.0000	SD = .7154

*13. Apply sales promotion techniques for advertising and marketing.

Mean = 5.3226	Median = 5.0000	Mode = 5.0000	SD = .9087

14. Apply the basics of packaging design.

Mean = 5.5806	Median = 6.0000	Mode = 6.0000	SD = .6204

15. Determine the costs associated with graphic design and other creative services.

Mean = 5.8065	Median = 6.0000	Mode = 6.0000	SD = .8725

16. Explain and evaluate customer service issues.

Mean = 5.6774	Median = 6.0000	Mode = 6.0000	SD = .9447

17. Apply the basics of graphic design for multimedia.

Mean = 6.0000	Median = 6.0000	Mode = 6.0000	SD = .8165

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

Mean = 6.3226	Median = 6.0000	Mode = 6.0000	SD = .5993

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

Mean = 6.3548	Median = 6.0000	Mode = 6.0000	SD = .5507

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

Mean =5.9677	Median = 6.0000	Mode = 6.0000	SD = .7521

21. Prepare various digital documents.

Mean = 6.4516	Median = 6.0000	Mode = 6.0000	SD = .5680

22. Apply the principles and techniques of color theory and management.

Mean = 6.4194	Median = 6.0000	Mode = 7.0000	SD = .6204

*23. Apply the techniques of digital prepress, including finishing files for print or web, imposition, substrate selection, ink selection, finishing operations, and an understanding of print processes.

Mean = 6.0968	Median = 6.0000	Mode = 6.0000	SD = .7463

24. Apply the techniques of photographic lighting.

Mean = 5.3548	Median = 5.0000	Mode = 6.0000	SD = .9146

25. Apply the techniques of photography.

Mean = 5.5484	Median = 6.0000	Mode = 5.0000	SD = .8501

26. Apply the techniques of screen printing.

Mean = 4.6774	Median = 5.0000	Mode = 4.0000	SD = .9087

27. Apply the techniques of using drawing software.

Mean = 5.7419	Median = 6.0000	Mode = 6.0000	SD = .8932

28. Apply the techniques of using multimedia creation software.

Mean = 5.7742	Median = 6.0000	Mode = 6.0000	SD = .8046

29. Apply the techniques of using page layout and publishing software.

Mean = 6.4839	Median = 7.0000	Mode = 7.0000	SD = .5699

30. Apply the techniques of using image editing software.

Mean = 6.4516	Median = 7.0000	Mode = 7.0000	SD = .6239

*31. Apply the techniques of webpage development software, as well as basic html, css, web analytics, and wireframing.

Mean = 5.8710	Median = 6.0000	Mode = 6.0000	SD = .8059

*32. Apply the techniques of video and audio editing software.

Mean = 5.2581	Median = 5.0000	Mode = 5.0000	SD = 1.1245

33. Apply the techniques of 3D and motion design software.

Mean = 4.9355	Median = 5.0000	Mode = 6.0000	SD = 1.0626

34. Apply the techniques of traditional production and drawing tools.

Mean = 5.6000	Median = 6.0000	Mode = 6.0000	SD = 1.1919

Note * Newly added or modified statements.
[a] n = 31
[b] Statements with the highest mean scores, or those closest to seven, are considered most important.

gathered. The modified Delphi method used for this study concluded with three rounds, with one additional round to be used to gain a clearer consensus.

Newly identified tools from round 3 included social media tools; Dropbox; the Cloud between designer, customer, and printer; external hard drive; Pantone swatchbook; and paper swatches. These tools were included in round four along with those identified by 50% or more of participants from round two.

Round Four Results

Round four sought to gain a clearer understanding regarding statements considered to be most needed in an effective 21st century university-level graphic design program. Participants were asked to rank the top 20 statements most needed in order of importance. Participants were also asked, in a separate question, to rank tools most

Table 4: Round Four Mean Results for Most Needed Graphic Design Skills and Content Knowledge

Statement	Mean
1. Apply the basic principles of graphic design aesthetics, including composition.	3.58
2. Perform graphic design creatively.	5.84
3. Apply the concepts of typography.	6.13
4. Exhibit interpersonal skills (problem solving, curiosity, motivation, innovation, conceptual thinking, communication).	7.26
5. Write clearly, concisely, and correctly.	10.00
6. Exhibit effective presentation skills.	12.13
7. Understand the history of graphic design.	13.74
8. Knowledge of current communications industry trends (convergence, visual communication, storytelling, videography).	14.26
9. Apply the basics of graphic design for print production.	14.39
10. Exhibit skills in the foundations of artistic expression (painting, drawing, sculpting).	14.58
11. Apply the principles and techniques of color theory and management.	14.68
12. Apply foundational elements of graphic design, such as creating traditional paper mockups and hand-rendering of type.	15.03
13. Apply basic knowledge of Gestalt psychology to graphic design.	15.71
14. Apply the basics of graphic design for webpage development.	15.84
15. Apply the basics of graphic design for multimedia.	15.97
16. Apply the techniques of using page layout and publishing software.	16.19
17. Apply the basics of photography for graphic design purposes.	16.42
18. Apply the techniques of using image editing software.	16.68
19. Prepare various digital documents.	16.87
20. Apply the techniques of digital prepress, including finishing files for print or web, imposition, substrate selection, ink selection, finishing operations, and an understanding of print processes.	18.10

Note. Statements are listed in order of importance. Rather than showing frequencies, the researcher determined that results could best be interpreted based on mean scores.
[a]n=31
[b]Statements receiving the lowest mean scores, or those closer to one, are those considered most important.

needed in a university-level graphic design program, again in order of importance. Results are shown in tables 4 and 5.

Those statements receiving the lowest mean scores, or those closer to one, are those considered most important. Interestingly, the three competencies identified in the top five from the previous rounds were once again in the top five of round four. However, one statement not previously included in the top five in any of the previous rounds was identified in this final round. The statement was "write clearly, concisely, and correctly," which consistently ranked among the highest in all three rounds with a mean score of at least 6.4; however, it was not a top-five competency until the final round. Also, those competencies ranking the lowest in all three previous rounds were again among the lowest in this fourth round.

Participants also overwhelmingly identified the Adobe Creative Suite as being the most needed tool for an effective university-level graphic design program, with 26 out

Table 5: Round Four Mean Results for Most Needed Graphic Design Tools

Statement	Mean
1. Adobe Creative Suite (Photoshop, Illustrator, InDesign, Acrobat, Bridge)	1.19
2. Microsoft Office (Word, Excel, Powerpoint)	5.39
3. Sketchbooks	5.87
4. Adobe Dreamweaver	6.16
5. Printers	6.45
6. Scanners	7.42
7. Macbook Pro Laptop	7.45
8. Social media tools	8.10
9. "the Cloud" between designer, client, and printer	8.45
10. Rulers	8.97
11. Pantone swatchbook	8.97
12. Dropbox	9.03
13. External hard drive	10.42
14. Paper swatches	11.13

Note. Tools are listed in order of importance. Rather than showing frequencies, the researcher determined that results could best be interpreted based on mean scores.
[a]n=31
[b]Tools receiving the lowest mean scores, or those closer to one, are those considered most important.

of 31 participants selecting it as number one. Those tools ranking in the bottom regarding order of importance were Dropbox, external hard drive, and paper swatches.

Summary and Findings

One goal of this study was to examine how evolving technology is impacting 21st century skills, content knowledge, and tools needed in an effective university-level graphic design program. However, technology has not played a significant role in altering competencies needed in an effective university-level graphic design program. One notable example of this is the fact that the third most needed tool, as identified by experts, was a sketchbook. It is interesting that this study, conducted several years after Wang's study, did not reveal any new, highly desired competencies based on technology. Though numerous tools related to technology were selected as highly necessary, the competencies identified in this study were not necessarily competencies dependent on technology. Since content-knowledge areas, specifically application and performance-type competencies, were selected as most needed in this research, one can assume that adaptability to the technology is more desirable than the student having a working knowledge of each and every piece of technology available. This is not to say, however, that findings from this research did not uncover new technological trends that are being applied to the graphic design field, as evidenced by participants selecting social media and "the Cloud" as two top ranking tools.

The second goal of this study was to determine how to best prepare graphic design students for the industry. Since graphic design programs are not required to undergo accreditation, it is up to graphic design educators along with industry professionals to ensure that these highly significant competencies are being included in the current graphic design curriculum. McCoy (1990) stated that though the industry desires students who possess skills-based competencies, it is the duty of the educator to impart more long-term skills required for students to be successful in life.

A significant issue in graphic design education is that many students are graduating with similar graphic design degrees but with dissimilar skills and content knowledge. Some students are under the impression that they are professional graphic designers, when in fact they have not received an adequate number and/or scope of courses focusing in graphic design. Since required accreditation by NASAD of all graphic design programs is not feasible

as a solution to this problem, one must look for alternatives. Based on an examination of research in other disciplines, such as education (Grayson, 2011; Cranton & Legge, 1978), the most logical application for assessing and/or developing a graphic design curriculum encompassing each of the competencies identified in this research is to conduct a program evaluation in each institution offering graphic design degrees not overseen by NASAD. This would need to be conducted by those teaching in the graphic design program of each institution. Upon completion of the program evaluation, it would be appropriate for the findings to lead to the incorporation of the competencies identified in this study. In some cases, results of the program evaluation may also lead to validation of existing graphic design curricula.

Conclusion

Wang (2006) stated in the closing remarks of his research that "there is a critical need to build on this research and ensure appropriate curriculum is available for education specialists" (p. 81). This contention is essentially what was achieved in this current study. Though it was originally thought that technology would have a more significant role in the identification of 21st century skills and content knowledge, the confirmation that the core concepts of graphic design remain the most important is essential to curriculum development and assessment of 21st century university-level graphic design programs. This idea can best be summed up by considering a statement received from one of the participants of this study.

> The most critical competency a student can bring forth is their innovative thinking and confidence to think creatively. Tools will change, techniques will vary, but the confident, creative mind has consistently been of service to humanity and will continue to be (of service). The ideation process that seeks to understand, explore, develop new insights, and then create and iterate is the heart of innovation and creativity. Tools and techniques are just tools and techniques in the hands of smart creative thinkers.

References

Cranton, P. A. & Legge, L. H. (1978). Program evaluation in higher education. *The Journal of Higher Education,* 49(5), 464–471.

Davis, M. (2005). Raising the bar for higher education. In S. Heller *The education of a graphic designer* (pp. 13–21). New York, NY: Allworth Press.

Grayson, T. (2011). Program evaluation in higher education. In C. Secolsky & D. B. Denison *Handbook on measurement, assessment, and evaluation in higher education* (section 5). Retrieved from www.aacu.org/ meetings /engaging_depts/documents/Program EvaluationChapterFinalDraftSubmitted 5–15–2011. pdf

Heller, S. (2005). Too many grads or too few competencies? The design school dilemma. *American Institute of Graphic Arts.* Retrieved March 13, 2012, from http:// www.aiga.org/too-many -grads-or-too-few- competencies-the-design-school- dilemma/

Judd, R. (1972). Use of Delphi methods in higher education. *Technological Forecasting and Social Change, 4*, 173–186.

Lunkenheimer, G. (2002). Identifying e-commerce competencies for marketing education: A national Delphi study. (Doctoral Dissertation). Retrieved from ProQuest Dissertations and Theses. (3052196)

McCoy, K. (1990). Professional design education: An opinion and a proposal. *Design Issues, 7(1),* 20–22.

Rowe, G., & Wright, G. (1999). The Delphi technique as a forecasting tool: Issues and analysis. *International Journal of Forecasting, 15*, 353-375.

Riggs, W. (1983). The Delphi technique: An experimental evaluation. *Technological Forecasting and Social Change, 23*, 89-94.

Wang, Shyang-Yuh. (2006). Identification of the significant competencies in graphic design. Doctoral Dissertation. ProQuest Dissertations and Theses 3284809 (Accessed August 1, 2011).

Manuscript Form and Style

- Prepare manuscripts according to the APA style, including the reference list.

- List your name and address on the first page only. Article text should begin on the second page.

- Provide a short biography for yourself that can be used if the article is accepted for publication.

- All articles must be submitted in electronic form on a CD-ROM or as an email attachment.

- Submit a Microsoft Word document, maximum of 10 pages (excluding figures, tables, illustrations, and photos). Do not submit documents created in page-layout programs.

- Word documents must have been proofread and be correct.

- Call out the approximate location of all tables and figures in the text. Use the default style "Normal" on these callouts. The call-outs will be removed by the designer.

- Use the default Word styles only. Our designer has set up the page layout program styles to correspond to those style names.
  - Heading 1
  - Heading 2
  - Heading 3
  - Normal

Graphics

- Be sure that submitted tables and other artwork are absolutely necessary for the article.

- Write a caption for each graphic, include captions in a list at the end of your Word document.

- Electronic artwork is preferred and should be in PDF or TIFF format.

- Send all artwork files and hard copies of these files with your submission.

Tables

- Set up tables in separate documents, one document for each table.

- Do not attempt to make it "pretty." Use the default Word style "Normal" for all table text. Do not use any other formatting.

- Do not use hard returns inside the table ("enter" or "return").

- Get the correct information into the correct cell and leave the formatting to the designer.

- Tables will be formatted by the designer to fit in one column (3.1667" wide) or across two columns (6.5" wide).

Artwork

- Scan photographs at 300 ppi resolution.

- Scan line drawings at 800 ppi resolution.

- Screen captures should be as large as possible.

- Graphics should be sized to fit in either one column or across two columns.
  - One column is 3.1667" wide, two columns are 6.5" wide.
  - Graphics may be larger than these dimensions, but must not be smaller.

Manuscript Guidelines

Eligibility for Publication

Members of the Graphic Communications Education Association, or students of GCEA members, may publish in the *Visual Communications Journal.*

Audience

Write articles for educators, students, graduates, industry representatives, and others interested in graphic arts, graphic communications, graphic design, commercial art, communications technology, visual communications, printing, photography, desktop publishing, or media arts. Present implications for the audience in the article.

Types of Articles

The *Visual Communications Journal* accepts four levels of articles for publication:

1. Edited articles are accepted or rejected by the editor. The editor makes changes to the article as necessary to improve readability and/or grammar. These articles are not submitted to a panel of jurors. The decision of the editor is final.

2. Juried articles are submitted to the editor and are distributed to jurors for acceptance/rejection. Juried articles are typically reviews of the literature, state-of-the-art technical articles, and other nonempirical papers. Jurors make comments to the author, and the author makes required changes. The decision of the jurors is final.

3. Refereed articles are submitted to the editor and are distributed to jurors for acceptance/rejection. Refereed articles are original empirical research. Jurors make comments to the author and the author makes required changes. The decision of the jurors is final.

4. Student articles are submitted by GCEA members and are accepted/rejected by the editor. These articles are not submitted to a panel of jurors. The editor's decision is final. Please be aware that poorly written student papers will be rejected or returned for editing.

Submittal of Manuscripts

All manuscripts must be received by the editor no later than December 15th to be considered for the spring *Journal* or by June 15th to be considered for the fall *Journal*. Include digital copies of all text and figures. Prepare text and artwork according to the instructions given in these guidelines. Be sure to include your name, mailing address, e-mail address, and daytime phone number with your materials. E-mail all materials to the editor (address shown below).

Acceptance and Publication

If your article is accepted for publication, you will be notified by e-mail. The *Visual Communications Journal* is published and distributed twice a year, in the spring and in the fall. Printed copies are mailed to GCEA members. A PDF version of the *Journal* is published online at www.GCEAonline.org.

Notice

Articles submitted to the *Journal* cannot be submitted to other publications while under review. Articles published in other copyrighted publications may not be submitted to the *Journal*, and articles published by the *Journal* may not be published in other publications without written permission of the *Journal.*

Submit All Articles and Correspondence to:
Dan Wilson, dan.wilson@illinoisstate.edu
or check www.GCEAonline.org for contact information
for the GCEA First Vice-President.

See following page for style guidelines