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

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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 developed 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

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean</th>
<th>Median</th>
<th>Mode</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understand the history of graphic design.</td>
<td>6.1579</td>
<td>6.0000</td>
<td>7.0000</td>
<td>1.1514</td>
</tr>
<tr>
<td>2. Apply sales promotion techniques for advertising and marketing.</td>
<td>5.5789</td>
<td>6.0000</td>
<td>6.0000</td>
<td>1.2656</td>
</tr>
<tr>
<td>3. Determine the costs associated with graphic design and other creative services.</td>
<td>5.8649</td>
<td>6.0000</td>
<td>6.0000</td>
<td>1.3158</td>
</tr>
<tr>
<td>4. Explain and evaluate customer service issues.</td>
<td>6.0263</td>
<td>6.0000</td>
<td>6.0000</td>
<td>1.8216</td>
</tr>
</tbody>
</table>
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 |
|-----------------------------------------------|-----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
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
\( n=33\)

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
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

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 = 6.9068 Median = 6.0000 Mode = 6.0000 SD = .7463

24. Apply the techniques of photographic lighting.
Mean = 5.5348 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 = 4.6474 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 swatch book; 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...
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 of 31 participants listing it as the most important tool. Other commonly cited tools included Microsoft Office, sketchbooks, Adobe Dreamweaver, printers, scanners, Macbook Pro laptops, social media tools, and Dropbox.

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

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

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.

n=31

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

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

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.

n=31

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


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  - Heading 2
  - Heading 3
  - Normal

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