

MINNESOTA TUNING PROJECT: BIOLOGY AND GRAPHIC DESIGN SURVEY RESULTS

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INTRODUCTION

The Bologna process was launched with the meeting of 29 education ministers from across Europe in 1999 with a focus on transforming European Higher Education. With a goal of advancing mobility across borders for an advanced knowledge workforce the convergence of educational practices and standards was necessary (Adelman, 2009). What began with the involvement of 29 countries, later joined by 17 additional countries, has developed into an endeavor that now includes 4,000 institutions of higher education serving over 16 million students (Adelman, 2008; 2009).

The “Tuning” Method

One method used to support convergence within the Bologna process is known as “Tuning.” The faculty-developed model of tuning “is the process of ‘harmonizing’ higher education programs and degrees by defining learning outcomes of the curricula by subject area” (Lumina Foundation for Education, 2009, p. 1). In 2009, the Lumina Foundation released a request for state proposals to conduct an exploratory Tuning project in the U.S. setting. Upon invitation to participate, Minnesota submitted a proposal, and launched the Minnesota Tuning Project for the disciplines of Biology and Graphic Design in April 2009.

The Minnesota Tuning Project Survey

Within the tuning methodology, a key step is the utilization of a consultative survey. The objectives established in the Bologna process for the tuning survey “include gleaning current perspectives on the diversity of practice and commonality of knowledge across borders and traditions, and seeking a simple and accessible language to create a scaffolding on which the various degrees can work in comfort and trust” (Adelman, 2009, p. 49). The Minnesota tuning surveys sought the consultation of previous graduates, current students, employers of graduates, and academic faculty for each of the disciplines involved in tuning.

METHODOLOGY

Survey Design

Each survey contained the original Bologna tuning survey “general competence” questions (questions 1-34); however, the biology and graphic design teams chose the discipline-specific competence questions. The teams also added their own qualitative questions to the end of the survey. The Bologna tuning project distinguishes three types of generic competences that were also measured in the Minnesota survey:

- Instrumental competences: cognitive abilities, methodological abilities, technological abilities and linguistic abilities;
- Interpersonal competences: individual abilities like social skills (social interaction and co-operation);

- Systemic competences: abilities and skills concerning whole systems (combination of understanding, sensibility and knowledge; prior acquisition of instrumental and interpersonal competences required) (Gonzalez & Wagenaar, 2008).

These competences are embedded within the general competence section of the survey and are also reflected in the discipline-specific competence areas.

Data Collection

The online survey was distributed to a total of 5,542 participants (4,278 biology and 1,225 graphic design) who were current students (3,071 total; 2,472 biology and 599 graphic design students), alumni (1,939 total; 1,729 biology and 210 graphic design alumni), employers (334 total; 32 biology and 302 graphic design employers), or faculty (198 total; 175 biology and 23 graphic design faculty). The response rate was 6.8% (377 total respondents; 265 biology and 112 graphic design respondents) as of Thursday, October 29 (Table 1).

Table 1: Survey Distribution by Participant Type, Discipline, and Institution

Institution	Biology: 4278 total				Graphic Design: 1225 total				Total
	University of MN	Moorhead State University	North Hennepin Community College	Carleton College	University of MN	Alexandria Technical College	South Central College	Bemidji State University	
Students	1846	411	103	112	271	92	80	156	3071
Alumni	1350	190	2	187	42	25	64	79	1939
Faculty	140	12	6	17	12	3	4	4	198
Employers	0	20	12	0	201	28	19	54	334
Grand Total	3336	633	123	316	526	148	167	293	5542

Students, alumni, and faculty were selected from the following universities:

Biology:

- University of Minnesota, Twin Cities
- Minnesota State University Moorhead
- North Hennepin Community College
- Carleton College

Graphic Design:

- University of Minnesota, Twin Cities
- Alexandria Technical College
- South Central College
- Bemidji State University

The project design teams identified all participants for the survey. Surveys were distributed either by the Minnesota Office of Higher Education or by individuals on the project design teams. Participants were sent invitations via email beginning October 5, 2009 and the survey closed October 20, 2009. A summary of survey respondent demographics is included in the results details located in Appendix B and C.

Data Analysis

A Chi-square analysis was used to determine if there was a statistically significant difference in responses amongst students, faculty, alumni and business professionals. Tests were conducted on the 31 competencies and evaluated by importance, and level to which the competency was developed by the institution. Statistically significant results are marked with asterisks (* $p < .05$, ** $p < .01$, *** $p < .001$). The more statistically significant the result, the more disagreement there is amongst students, faculty, businesses, and alumni.

Competencies were rank ordered in order of importance. For example, respondents to the graphic design survey ranked creativity as the most important competency. Qualitative data was delineated by institution and respondent type, and also analyzed for themes. See appendix B & C to view the data.

Trustworthiness and Limitations

In considering the survey design, administration and results the following limitations need to be noted:

- Due to the convenience sampling technique used to generate the survey samples, the results of the survey are only representative of the respondents and should not be generalized beyond the survey respondents.
- The data generated by the survey is self-reported.
- The survey response rate in this administration (6.8%) was low. While there were 377 total respondents (265 biology and 112 graphic design), when responses are segregated by respondent or institution type the number within some sub-groups is small. Therefore, caution needs to be taken to not over-represent the results when segregated by respondent or institution type.
- The online administration of the survey maintained anonymity of respondents, therefore information such as respondent knowledge of the project or possible participation on a tuning project team may differ among survey respondents. In addition, it is unknown how survey respondents may or may not differ from non-respondents.

RESULTS

In the Chi-square analyses, respondents were more likely to disagree over the level to which the competency was developed by an institution. There was considerably more agreement over the competency's importance (or lack thereof). This was true for both the biology and graphic design survey respondents. Each respondent had four choices when examining the importance and level to which the competency was developed by the institution: strong (rated as 4), considerable (3), weak (2) and none (1).

Over 50 significant results were found in the analysis. Due to time constraints, all of the results are listed in the Appendices. We hope to publish the results in the future and will then have the time to tease out some of the more interesting findings.

To interpret the results, here is an example: The final general competency in the instrument is the appreciation of and respect for diversity and multiculturalism. In the biology survey, there was significant disagreement amongst the four respondent types at the .05 level as denoted by one asterisk next to the question number. Forty-six percent of businesses, 49% alumni, and 38% of students responded that this was *strongly* developed by the institution. However, only 23% of faculty felt the same way, with more faculty (46%) who believed the extent to which the institution developed appreciation and respect for diversity was *weak*.

Level to which developed

	<u>Appreciation of and respect for diversity and multiculturalism*</u>			
	1	2	3	4
Business (n=22)	9%	5%	41%	46%
Faculty (n=13)	0	46	31	23
Alum (n=81)	0	12	38	49
Student (n=174)	2	17	43	38

*Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.*

The top rank ordered competencies for graphic design are located in Appendix C. For Biology, see Appendix B.

DISCUSSION

The disconnect between an overall shared view in the importance of many competencies, and a lack of congruence in the level to which stakeholders view the competency as developed by the institution calls for more communication amongst the respondent types. It is encouraging to note that overall, there is agreement regarding the importance of the various competencies. There are a few cases in which there is disagreement concerning the importance of the competence. This calls for future analysis to understand why these gaps in the perceived value of the competencies exist.

Respondents for biology were asked to rank which areas of importance for post-graduate success. Those ranked most important were genetics and molecular biology, biochemistry, and physiology and organismal biology. Those ranked toward medium importance included genomics, evolutionary biology, chemistry, and statistics. Lower importance included ecology and ecosystems, physics, geosciences, and calculus.

Graphic Design Qualitative Results

Common themes were found within each of the questions among all respondents, signifying the importance of these areas. These themes also corresponded with the competency questions earlier in the survey. Respondents generally felt as though four-year students had more advanced development across several areas than two-year students.

<i>Question 41 skills for 2-year</i>	<i>Question 42 skills lacking 2-year</i>	<i>Question 43 skills for 4-year</i>	<i>Question 44 skills lacking 4-year</i>	<i>Question 45 expected of 4-year versus 2-year</i>
<ul style="list-style-type: none"> • Communication • Digital design • Design principles and skills • Creativity • Time management • Passion, tenacity • Problem solving • Critical thinking • Work ethic 	<ul style="list-style-type: none"> • Communication • Client relationships • Design skills • Critical thinking • Internships • Broad-based, liberal education • Creativity • Critical thinking and analysis • Initiative • Time management • In-depth knowledge 	<ul style="list-style-type: none"> • Communication • Digital design • Design principles and skills • Creativity and innovation • Portfolio • Time management • Passion, tenacity • Problem solving • Critical and abstract thinking • Real world experience 	<ul style="list-style-type: none"> • Communication • Client relationships • Design skills • Digital design • Critical thinking and ability to be self-critical • Real world experience • Time management • Business acumen • Attention to detail 	<ul style="list-style-type: none"> • Communication • Business acumen • Confidence • Variety of design skills • Well-rounded, broader portfolio • Critical thinking and synthesis • Social, historical, ethical, and cultural contexts • Digital design • Worldly (study abroad experience)

Biology Qualitative Results

The results listed below correspond to the single qualitative question, “are there any other qualities of a biology major that you consider important but were not listed in this survey? If so, please describe.” There were distinct differences in the responses of individuals, as noted below.

<i>Business (n=9)</i>	<i>Faculty (n=5)</i>	<i>Alumni (n=16)</i>	<i>Students (n=29)</i>
<ul style="list-style-type: none"> • Communication (in general and with employers) • Computer/GIS experience • Physical/field activities and equipment use • Work ethic • People skills 	<ul style="list-style-type: none"> • Experimental design • Learn material in depth (beyond what is presented in classroom) • Team work 	<ul style="list-style-type: none"> • Behavioral ecology of humans • Research methods • Computational methods in biological science • Multitasking • Interdisciplinary connections 	<ul style="list-style-type: none"> • More internships, volunteering, and community observation • Importance of relationship between theory, research, and practice • Written/communication skills, write/evaluate scientific literature • Human biology, neuroscience,

			microbiology, environmental studies • Laboratory hands-on skills • Self-motivation
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CONCLUSION

The Minnesota Tuning Project for the disciplines of Biology and Graphic Design launched an opportunity to pilot the “Tuning” methodology in Minnesota. The consultative surveys designed by the tuning teams provide insight into the importance of competencies and level to which competencies are developed from the perspective of students, alumni, faculty and employers. In addition, the surveys provide information to be used by the tuning teams in the consideration of general competencies and discipline specific competencies rated most important for their respective disciplines.

21. Capacity to learn and stay up-to-date with learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Capacity to generate new ideas (creativity)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Ability to evaluate and maintain the quality of work produced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Ability to work in a team	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Commitment to the conservation of the environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Knowledge and understanding of the subject area and understanding of the profession	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Ability for abstract thinking, analysis and synthesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Ability to work autonomously	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Ability to make reasoned decisions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Ability to plan and manage time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Appreciation of and respect for diversity and multiculturalism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Please rank below the five most important of the previous competences according to your opinion. Please select the number of the most important competence in the first pull-down menu, the second most important in the second menu, and so on.

Most important competence number:

2nd most important:

46. Recognizes the contributions of diverse cultures and individuals to biology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Practices professional and ethical standards in biology and its applications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

48. Rank the importance of each area for post-graduate success in your field (1 = most important):

- Genetics and molecular biology
- Genomics
- Evolutionary biology
- Biochemistry
- Physiology and organismal biology
- Ecology and ecosystems
- Chemistry
- Physics
- Geosciences
- Calculus
- Statistics

49. Are there any other qualities of a biology major that you consider important but were not listed in this survey? If so, please describe:

24. Ability to work in a team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. Commitment to the conservation of the environment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Knowledge and understanding of the subject area and understanding of the profession	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. Ability for abstract thinking, analysis and synthesis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. Ability to work autonomously	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. Ability to make reasoned decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Ability to plan and manage time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Appreciation of and respect for diversity and multiculturalism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rank below the five most important of the previous competences according to your opinion. Please select the number of the most important competence in the first pull-down menu, the second most important in the second menu, and so on.

Most important competence number:

2nd most important:

3rd most important:

4th most important:

5th most important:

Graphic Design Competence	Importance				Level to which developed by College or University Degree			
	strong	considerable	weak	none	strong	considerable	weak	none
35. Thinks as a designer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Makes connections within the broader fields of communication and design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Poses and solves problems utilizing design methods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Remains current with aesthetic and theoretical ideas in graphic design.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Works effectively with both computers and non-electronic media to create, investigate, and experiment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Considers design problems in their historical, cultural, and ethical context.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

41. What are the 3 most important skills for 2-year design graduates to be successful?

42. What skills are 2-year design graduates lacking?

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43. What are the 3 most important skills for 4-year design graduate to be successful?

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44. What skills are 4-year design graduates lacking?

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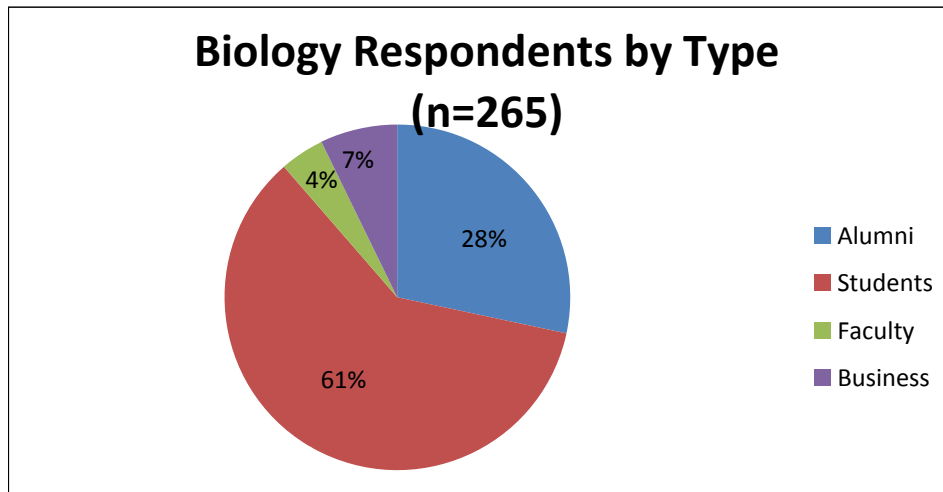
45. What specific skills and/or knowledge do you expect from a 4-year design graduate that you would not expect from a 2-year design graduate?

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APPENDIX B: BIOLOGY TUNING PROJECT SURVEY RESULTS

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BIOLOGY TUNING SURVEY RESPONDENT SUMMARY

- 265 Total Respondents
 - 75 Alums
 - 73 from University of Minnesota
 - 2 from Minnesota State University—Moorhead
 - 160 Current Students
 - 113 from University of Minnesota
 - 47 from Minnesota State University—Moorhead
 - 11 Faculty Members
 - 6 from North Hennepin Community College
 - 5 from Minnesota State University—Moorhead
 - 19 Business
 - No identification on institutional affiliation

BIOLOGY TUNING SURVEY GENERAL COMPETENCIES**Table 1: Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)***Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)*

	<i>Ability to undertake research at an appropriate level</i>				<i>Ability to work in an international context*</i>				<i>Ability to communicate in a second language**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	14%	46%	41%	0%	67%	22%	11%	32%	32%	32%	5%
Faculty (n=13)	0	0	39	62	14	45	36	5	15	77	8	0
Alum (n=81)	0	1	26	73	0	17	67	17	14	48	30	9
Student (n=174)	2	6	33	59	2	16	57	25	14	32	43	12

Level to which developed

	<i>Ability to undertake research at an appropriate level***</i>				<i>Ability to work in an international context</i>				<i>Ability to communicate in a second language</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	9%	59%	23%	32%	27%	32%	9%	41%	27%	23%	9%
Faculty (n=13)	0	23	46	31	23	62	15	0	39	62	0	0
Alum (n=81)	0	9	33	58	11	31	42	16	42	35	14	10
Student (n=174)	1	5	32	63	13	29	44	14	36	40	21	3

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to act on the basis of ethical reasoning</i>				<i>Interpersonal and interaction skills</i>				<i>Ability to be critical and self-critical**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	55%	46%	0%	0%	9%	91%	0%	0%	46%	55%
Faculty (n=13)	0	0	39	62	0	0	39	62	0	0	69	31
Alum (n=81)	0	9	31	61	0	3	20	78	0	0	22	78
Student (n=174)	1	5	37	58	0	2	24	75	0	1	25	74

Level to which developed

	<i>Ability to act on the basis of ethical reasoning</i>				<i>Interpersonal and interaction skills*</i>				<i>Ability to be critical and self-critical***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	18%	46%	27%	9%	18%	41%	32%	9%	23%	27%	41%
Faculty (n=13)	0	31	46	23	0	15	62	23	0	39	62	0
Alum (n=81)	1	9	47	43	0	14	47	40	0	6	46	48
Student (n=174)	3	22	44	32	1	10	41	48	1	12	41	47

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to search for, process and analyze information from a variety of sources</i>				<i>Ability to communicate both orally and through the written word in native language</i>				<i>Ability to design and manage projects*</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	18%	82%	0%	5%	14%	82%	0%	14%	41%	46%
Faculty (n=13)	0	0	39	62	0	0	31	70	8	15	54	23
Alum (n=81)	0	0	16	84	1	1	11	86	0	1	53	46
Student (n=174)	0	2	22	76	2	4	25	69	1	10	42	47

Level to which developed

	<i>Ability to search for, process and analyze information from a variety of sources***</i>				<i>Ability to communicate both orally and through the written word in native language***</i>				<i>Ability to design and manage project**s</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	9%	41%	41%	9%	18%	32%	41%	9%	27%	41%	23%
Faculty (n=13)	0	23	54	23	0	23	69	8	8	54	23	15
Alum (n=81)	0	3	38	59	0	9	28	63	0	26	50	25
Student (n=174)	0	3	35	63	1	8	37	54	1	16	49	32

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Determination and perseverance in the tasks given and responsibilities taken</i>				<i>Ability to adapt to and act in new situations</i>				<i>Ability to act with social responsibility and civic awareness</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	23%	77%	0%	0%	32%	68%	0%	9%	36%	55%
Faculty (n=13)	0	0	31	69	0	0	46	54	0	8	54	39
Alum (n=81)	0	0	22	78	0	3	28	69	1	12	40	47
Student (n=174)	1	1	32	67	0	3	35	62	1	9	39	51

Level to which developed

	<i>Determination and perseverance in the tasks given and responsibilities taken***</i>				<i>Ability to adapt to and act in new situations**</i>				<i>Ability to act with social responsibility and civic awareness</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	23%	41%	27%	9%	23%	31%	36%	9%	9%	46%	36%
Faculty (n=13)	0	39	46	15	0	23	69	8	0	39	39	23
Alum (n=81)	1	4	27	68	0	9	47	44	3	11	51	36
Student (n=174)	1	7	44	49	1	17	56	26	3	19	51	28

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to motivate people and move toward common goals**</i>				<i>Ability to identify, pose and resolve problems</i>				<i>Spirit of enterprise, ability to take initiative</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	5%	50%	46%	0%	0%	32%	68%	0%	9%	41%	50%
Faculty (n=13)	0	39	39	23	0	0	31	69	0	15	31	54
Alum (n=81)	0	11	37	52	0	1	19	80	0	7	37	56
Student (n=174)	0	6	47	48	0	2	22	75	0	5	47	48

Level to which developed

	<i>Ability to motivate people and move toward common goals***</i>				<i>Ability to identify, pose and resolve problems***</i>				<i>Spirit of enterprise, ability to take initiative</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	14%	36%	18%	32%	14%	18%	27%	41%	9%	27%	41%	23%
Faculty (n=13)	0	46	54	0	0	8	85	8	0	39	54	8
Alum (n=81)	0	20	46	35	0	5	47	48	0	20	48	32
Student (n=174)	2	22	52	24	0	7	45	48	2	17	49	32

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to apply knowledge in practical situations</i>				<i>Skills in the use of information and communications technologies</i>				<i>Ability to communicate with non-experts in one's field</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	5%	23%	73%	0%	5%	41%	55%	0%	5%	41%	55%
Faculty (n=13)	0	0	39	62	0	8	39	54	0	23	46	31
Alum (n=81)	0	1	15	84	0	7	37	56	4	6	30	61
Student (n=174)	0	2	22	75	0	5	46	49	1	13	40	47

Level to which developed

	<i>Ability to apply knowledge in practical situations***</i>				<i>Skills in the use of information and communications technologies*</i>				<i>Ability to communicate with non-experts in one's field***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	23%	32%	36%	9%	5%	32%	55%	9%	27%	32%	32%
Faculty (n=13)	0	39	39	23	0	15	46	39	0	62	31	8
Alum (n=81)	1	6	51	42	0	16	43	41	1	15	40	44
Student (n=174)	0	12	45	43	1	16	49	35	1	35	44	21

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Commitment to safety*</i>				<i>Ability to show awareness of equal opportunities and gender issues</i>				<i>Capacity to learn and stay up-to-date with learning</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	14%	86%	0%	5%	64%	32%	0%	0%	41%	59%
Faculty (n=13)	0	8	54	39	8	23	39	31	0	8	39	54
Alum (n=81)	1	14	30	56	6	22	36	36	0	0	19	82
Student (n=174)	0	5	41	54	3	21	39	36	0	2	24	75

Level to which developed

	<i>Commitment to safety***</i>				<i>Ability to show awareness of equal opportunities and gender issues</i>				<i>Capacity to learn and stay up-to-date with learning***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	14%	23%	23%	41%	9%	5%	46%	41%	9%	0%	41%	50%
Faculty (n=13)	0	46	39	15	0	15	54	31	0	31	54	15
Alum (n=81)	3	7	37	53	3	15	36	47	0	5	36	59
Student (n=174)	1	6	44	49	6	21	43	30	1	3	38	58

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Capacity to generate new ideas (creativity)*</i>				<i>Ability to evaluate and maintain the quality of work produced*</i>				<i>Ability to work in a team</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	9%	41%	50%	0%	5%	32%	64%	0%	0%	18%	82%
Faculty (n=13)	0	23	23	54	0	15	46	39	0	0	23	77
Alum (n=81)	0	1	33	65	0	1	26	73	0	4	27	69
Student (n=174)	0	6	39	55	0	2	34	64	0	3	28	68

Level to which developed

	<i>Capacity to generate new ideas (creativity)***</i>				<i>Ability to evaluate and maintain the quality of work produced***</i>				<i>Ability to work in a team***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	9%	46%	36%	9%	18%	32%	41%	9%	5%	50%	36%
Faculty (n=13)	0	46	39	15	0	15	85	0	0	0	54	46
Alum (n=81)	0	16	56	28	0	9	43	48	0	4	48	48
Student (n=174)	0	16	46	39	0	9	41	49	0	8	28	64

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Commitment to the conservation of the environment</i>				<i>Knowledge and understanding of the subject area and understanding of the profession</i>				<i>Ability for abstract thinking, analysis and synthesis</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	32%	68%	0%	0%	36%	64%	0%	14%	36%	50%
Faculty (n=13)	0	23	31	46	0	0	23	77	0	8	31	62
Alum (n=81)	5	22	35	38	0	0	26	74	0	3	38	59
Student (n=174)	2	20	39	40	0	2	18	80	0	9	29	62

Level to which developed

	<i>Commitment to the conservation of the environment</i>				<i>Knowledge and understanding of the subject area and understanding of the profession**</i>				<i>Ability for abstract thinking, analysis and synthesis***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	5%	50%	36%	9%	9%	55%	27%	14%	14%	36%	36%
Faculty (n=13)	8	31	39	23	0	0	54	46	0	23	54	23
Alum (n=81)	1	11	46	42	1	4	57	38	0	6	65	28
Student (n=174)	2	20	40	39	1	7	35	58	1	8	49	42

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)

Importance(4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to work autonomously</i>				<i>Ability to make reasoned decisions</i>				<i>Ability to plan and manage time</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	50%	50%	0%	0%	27%	73%	0%	0%	18%	82%
Faculty (n=13)	0	8	39	54	0	0	62	39	0	0	31	69
Alum (n=81)	0	1	30	69	0	0	19	82	0	0	17	83
Student (n=174)	1	4	40	55	0	1	24	75	0	2	21	77

Level to which developed

	<i>Ability to work autonomously***</i>				<i>Ability to make reasoned decisions***</i>				<i>Ability to plan and manage time***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	14%	23%	27%	36%	9%	3%	46%	32%	14%	9%	41%	36%
Faculty (n=13)	0	31	62	8	0	1	77	15	0	23	62	15
Alum (n=81)	0	4	30	67	0	0	36	64	1	7	33	58
Student (n=174)	1	10	52	36	0	7	42	54	1	6	43	50

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Biology Respondents by Competency for Importance and for Level to Which Developed (n=265)Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Appreciation of and respect for diversity and multiculturality</i>			
	1	2	3	4
Business (n=22)	0%	14%	46%	41%
Faculty (n=13)	0	39	15	46
Alum (n=81)	3	21	26	51
Student (n=174)	4	14	36	46

Level to which developed

	<i>Appreciation of and respect for diversity and multiculturality*</i>			
	1	2	3	4
Business (n=22)	9%	5%	41%	46%
Faculty (n=13)	0	46	31	23
Alum (n=81)	0	12	38	49
Student (n=174)	2	17	43	38

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

In response to survey question: “Please rank below the five most important of the previous competencies according to your opinion.”

Table 2: Rank order of most important competencies for post-graduate success among all respondents (n= 265)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to undertake research at an appropriate level	37	14
Knowledge and understanding of the subject area and understanding of the profession	26	10
Ability to identify, pose and resolve problems	19	7
Ability to apply knowledge in practical situations	18	7
Interpersonal and interaction skills	17	6
Ability to work in a team	13	5
Ability to learn and stay up-to-date with learning	12	5
Ability to search for, process and analyze information from a variety of sources	11	4
Ability to adapt to and act in new situations	10	4
Ability to communicate both orally and through the written word	10	4
Ability to plan and manage time	9	3
Ability to act on the basis of ethical reasoning	9	3
Ability for abstract thinking, analysis, and synthesis	8	3
Commitment to the conservation of the environment	8	3
Determination and perseverance in the tasks given and responsibilities taken	8	3
Ability to be critical and self-critical	8	3
Ability to make reasoned decisions	6	2
Ability to motivate people and move toward common goals	5	2
Commitment to safety	5	2
Capacity to generate new ideas	4	2
Ability to work in an international context	3	1
Ability to design and manage projects	2	1
Ability to communicate with non-experts of one’s field	2	1
Ability to evaluate and maintain the quality of work produced	2	1
Ability to communicate in a second language	1	.3
Spirit of enterprise, ability to take initiative	1	.3
Skills in the use of information and communications technologies	1	.3
Ability to work autonomously	1	.3
Appreciation of and respect for diversity and multiculturalism	1	.3

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

Table 3: Rank order of second most important competencies for all respondents (n= 265)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to communicate both orally and through the written word	20	8
Ability to identify, pose and resolve problems	18	7
Ability to search for, process and analyze information from a variety of sources	17	6
Ability for abstract thinking, analysis, and synthesis	16	6
Ability to undertake research at an appropriate level	15	6
Ability to apply knowledge in practical situations	15	6
Ability to adapt to and act in new situations	14	5
Knowledge and understanding of the subject area and understanding of the profession	13	5
Ability to plan and manage time	13	5
Interpersonal and interaction skills	12	5
Ability to work in a team	12	5
Ability to be critical and self-critical	10	4
Ability to communicate both orally and through the written word	10	4
Ability to communicate with non-experts of one's field	10	4
Ability to make reasoned decisions	9	3
Capacity to learn and stay up-to-date with learning	8	3
Ability to act on the basis of ethical reasoning	8	3
Determination and perseverance in the tasks given and responsibilities taken	8	3
Ability to design and manage projects	6	2
Capacity to generate new ideas	6	2
Ability to evaluate and maintain the quality of work produced	5	2
Ability to work autonomously	4	2
Commitment to safety	4	2
Skills in the use of information and communications technologies	4	2
Ability to motivate people and move toward common goals	3	1
Appreciation of and respect for diversity and multiculturalism	2	1
Ability to show awareness of equal opportunities and gender issues	1	.3
Ability to act with social responsibility and civic awareness	1	.3
Ability to communicate in a second language	1	.3
Ability to work in an international context	1	.3

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

Table 4: Rank order of third most important competencies for all respondents (n= 265)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to apply knowledge in practical situations	29	11
Ability to work in a team	20	8
Ability to identify, pose and resolve problems	19	8
Capacity to learn and stay up-to-date with learning	17	6
Ability for abstract thinking, analysis, and synthesis	17	6
Ability to communicate both orally and through the written word	16	6
Ability to plan and manage time	13	5
Interpersonal and interaction skills	11	4
Ability to search for, process and analyze information from a variety of sources	10	4
Ability to make reasoned decisions	10	4
Spirit of enterprise, ability to take initiative	8	3
Ability to act on the basis of ethical reasoning	7	3
Ability to design and manage projects	7	3
Ability to be critical and self-critical	6	2
Ability to adapt to and act in new situations	6	2
Ability to motivate people and move toward common goals	6	2
Commitment to the conservation of the environment	6	2
Knowledge and understanding of the subject area and understanding of the profession	6	2
Ability to make reasoned decisions	6	2
Capacity to generate new ideas	5	2
Ability to evaluate and maintain the quality of work produced	5	2
Ability to undertake research at an appropriate level	4	2
Ability to communicate in a second language	4	2
Determination and perseverance in the tasks given and responsibilities taken	4	2
Ability to act with social responsibility and civic awareness	2	1
Appreciation of and respect for diversity and multiculturalism	2	1
Commitment to safety	1	.3
Ability to show awareness of equal opportunities and gender issues	1	.3

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

Table 5: Rank order of fourth most important competencies for all respondents (n= 265)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to apply knowledge in practical situations	24	9
Ability to plan and manage time	17	6
Ability to search for, process and analyze information from a variety of sources	15	6
Ability to adapt to and act in new situations	15	6
Knowledge and understanding of the subject area and understanding of the profession	15	6
Ability for abstract thinking, analysis, and synthesis	15	6
Ability to work in a team	12	5
Capacity to generate new ideas	12	5
Interpersonal and interaction skills	12	5
Capacity to learn and stay up-to-date with learning	11	4
Determination and perseverance in the tasks given and responsibilities taken	11	4
Ability to be critical and self-critical	10	4
Ability to identify, pose and resolve problems	10	4
Ability to make reasoned decisions	9	3
Ability to communicate both orally and through the written word	8	3
Ability to motivate people and move toward common goals	8	3
Skills in the use of information and communications technologies	8	3
Ability to undertake research at an appropriate level	7	3
Ability to act on the basis of ethical reasoning	7	3
Ability to design and manage projects	7	3
Ability to work autonomously	5	2
Ability to evaluate and maintain the quality of work produced	5	2
Ability to work in an international context	4	2
Ability to communicate with non-experts of one's field	4	2
Appreciation of and respect for diversity and multiculturalism	3	1
Commitment to safety	3	1
Ability to act with social responsibility and civic awareness	3	1
Ability to communicate in a second language	1	.3
Spirit of enterprise, ability to take initiative	1	.3
Commitment to the conservation of the environment	1	.3
Ability to show awareness of equal opportunities and gender issues	1	.3

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

Table 6: Rank order of fifth most important competencies for all respondents (n= 265)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to plan and manage time	34	13
Ability to be critical and self-critical	18	7
Ability to identify, pose and resolve problems	18	7
Ability to work in a team	16	6
Ability to search for, process and analyze information from a variety of sources	14	5
Ability to communicate with non-experts of one's field	13	5
Capacity to learn and stay up-to-date with learning	11	4
Interpersonal and interaction skills	11	4
Ability to undertake research at an appropriate level	10	4
Ability to act on the basis of ethical reasoning	10	4
Ability to apply knowledge in practical situations	9	3
Determination and perseverance in the tasks given and responsibilities taken	9	3
Commitment to safety	8	3
Ability to evaluate and maintain the quality of work produced	8	3
Knowledge and understanding of the subject area and understanding of the profession	8	3
Ability for abstract thinking, analysis, and synthesis	8	3
Ability to make reasoned decisions	8	3
Appreciation of and respect for diversity and multiculturalism	8	3
Ability to communicate both orally and through the written word	8	3
Ability to act with social responsibility and civic awareness	7	3
Ability to adapt to and act in new situations	6	2
Spirit of enterprise, ability to take initiative	6	2
Skills in the use of information and communications technologies	6	2
Capacity to generate new ideas	6	2
Commitment to the conservation of the environment	4	2
Ability to motivate people and move toward common goals	3	1
Ability to design and manage projects	3	1
Ability to work autonomously	3	1
Ability to work in an international context	1	.3
Ability to show awareness of equal opportunities and gender issues	1	.3
Ability to communicate in a second language	1	.3

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

BIOLOGY SPECIFIC COMPETENCIES**Table 7: Percentage of Respondents by Biology Competency for Importance and for Level to Which Developed (n=265)***Importance* (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Possesses broad knowledge that integrates biology from molecular to ecosystem levels of complexity</i>				<i>Possesses an in-depth knowledge in at least one subfield of biology</i>				<i>Recognizes evolution as a unifying theme across biology</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	14%	41%	46%	0%	5%	36%	59%	14%	23%	36%	27%
Faculty (n=13)	0	0	62	39	0	8	39	54	0	15	15	69
Alum (n=81)	5	11	42	42	1	11	26	62	9	17	30	44
Student (n=174)	1	13	40	45	1	3	33	62	9	17	29	45

Level to which developed

	<i>Possesses broad knowledge that integrates biology from molecular to ecosystem levels of complexity</i>				<i>Possesses an in-depth knowledge in at least one subfield of biology***</i>				<i>Recognizes evolution as a unifying theme across biology**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	18%	41%	32%	9%	27%	27%	36%	14%	9%	46%	32%
Faculty (n=13)	0	8	62	31	0	15	54	31	0	8	54	39
Alum (n=81)	1	5	41	53	1	4	37	58	0	9	30	62
Student (n=174)	2	6	40	52	1	7	40	53	1	9	31	59

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 7 (cont.): Percentage of Respondents by Biology Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Makes connections between biology and physical sciences, math, engineering, and computer science</i>				<i>Frames creative biological questions</i>				<i>Designs and conducts experiments that apply scientific approaches and methods</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	5%	55%	41%	0%	14%	36%	50%	0%	9%	41%	50%
Faculty (n=13)	0	23	31	46	0	8	54	39	0	0	31	69
Alum (n=81)	1	11	38	50	5	11	32	52	4	5	21	70
Student (n=174)	2	6	46	47	2	13	37	48	1	6	25	68

Level to which developed

	<i>Makes connections between biology and physical sciences, math, engineering, and computer science*</i>				<i>Frames creative biological questions</i>				<i>Designs and conducts experiments that apply scientific approaches and methods**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	9%	41%	41%	9%	14%	46%	32%	9%	9%	50%	32%
Faculty (n=13)	0	54	23	23	0	15	46	39	0	8	54	39
Alum (n=81)	0	16	54	30	1	14	59	26	1	7	41	51
Student (n=174)	3	16	49	32	1	12	49	39	1	7	26	66

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 7 (cont.): Percentage of Respondents by Biology Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Accesses, uses and evaluates sources of information in biology, including published literature and scientific databases</i>				<i>Works effectively with computers and scientific instrumentation to acquire and analyze experimental data</i>				<i>Develops numerical, statistical, and graphical models to represent and simulate biological mechanisms</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	0%	36%	64%	0%	0%	55%	46%	0%	14%	46%	41%
Faculty (n=13)	0	0	39	62	0	8	39	54	0	0	46	54
Alum (n=81)	3	5	20	73	5	6	25	64	9	11	36	44
Student (n=174)	1	6	28	65	1	6	31	63	3	14	47	36

Level to which developed

	<i>Accesses, uses and evaluates sources of information in biology, including published literature and scientific databases***</i>				<i>Works effectively with computers and scientific instrumentation to acquire and analyze experimental data</i>				<i>Develops numerical, statistical, and graphical models to represent and simulate biological mechanisms***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	5%	41%	46%	9%	5%	36%	50%	14%	9%	36%	41%
Faculty (n=13)	0	31	39	31	0	23	39	39	0	39	54	8
Alum (n=81)	0	6	46	48	1	15	41	43	3	36	48	14
Student (n=174)	1	9	31	59	1	11	45	43	2	20	43	35

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 7 (cont.): Percentage of Respondents by Biology Competency for Importance and for Level to Which Developed (n=265)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Visually communicates data and concepts in oral, written and poster presentations</i>				<i>Considers biological problems in their historical, social and ethical context</i>				<i>Recognizes the contributions of diverse cultures and individuals to biology</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	0%	5%	23%	73%	0%	23%	36%	41%	5%	41%	23%	32%
Faculty (n=13)	0	0	46	54	0	39	31	31	0	54	8	39
Alum (n=81)	0	5	30	65	5	12	51	32	7	33	36	24
Student (n=174)	0	9	39	52	3	16	42	39	8	22	43	28

Level to which developed

	<i>Visually communicates data and concepts in oral, written and poster presentations***</i>				<i>Considers biological problems in their historical, social and ethical context*</i>				<i>Recognizes the contributions of diverse cultures and individuals to biology*</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=22)	9%	9%	36%	46%	9%	27%	32%	32%	14%	32%	23%	32%
Faculty (n=13)	0	39	0	62	0	62	31	8	8	62	15	15
Alum (n=81)	0	12	51	37	0	24	48	28	0	27	52	21
Student (n=174)	1	9	39	52	2	24	49	24	4	31	43	22

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 7 (cont.): Percentage of Respondents by Biology Competency for Importance and for Level to Which Developed (n=265)*Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)*

	<i>Practices professional and ethical standards in biology and its applications</i>			
	1	2	3	4
Business (n=22)	0%	5%	23%	73%
Faculty (n=13)	0	0	39	62
Alum (n=81)	6	5	28	61
Student (n=174)	1	6	30	63

Level to which developed

	<i>Practices professional and ethical standards in biology and its applications</i>			
	1	2	3	4
Business (n=22)	9%	14%	32%	46%
Faculty (n=13)	0	23	46	31
Alum (n=81)	3	4	46	48
Student (n=174)	2	8	44	46

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

In response to survey question #48. “Rank the importance of each area for post-graduate success in your field”

Table 6: Rank order of Genetics and Molecular Biology for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	62	23
2	58	22
3	45	17
4	28	11
5	29	11
6	22	8
7	8	3
8	2	1
9	4	2
10	2	1
11	5	2

Table 7: Rank order of Genomics for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	2	1
2	19	7
3	27	10
4	30	11
5	51	19
6	39	15
7	32	12
8	24	9
9	7	3
10	19	7
11	15	6

Table 8: Rank order of Evolutionary Biology for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	14	5
2	18	7
3	17	6
4	29	11
5	31	12
6	34	13
7	30	12
8	31	12
9	29	11
10	14	5
11	18	7

Table 9: Rank order of Biochemistry for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	42	16
2	29	11
3	50	19
4	39	15
5	22	8
6	23	9
7	15	5
8	14	5
9	6	2
10	3	1
11	2	1

Table 10: Rank order of Physiology and Organismal Biology for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	82	31
2	43	16
3	36	14
4	39	15
5	26	10
6	15	5
7	16	6
8	9	3
9	7	6
10	2	1
11	0	0

Table 11: Rank order of Ecology and Ecosystems for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	31	12
2	13	5
3	14	5
4	10	4
5	18	7
6	24	9
7	33	12
8	28	11
9	36	14
10	39	15
11	19	7

Table 12: Rank order of Chemistry for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	15	5
2	35	13
3	29	11
4	44	17
5	38	15
6	35	13
7	25	9
8	25	9
9	12	5
10	5	2
11	2	1

Table 13: Rank order of Physics for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	4	2
2	6	2
3	11	4
4	18	7
5	16	6
6	24	9
7	26	10
8	48	18
9	49	18
10	31	12
11	32	12

Table 14: Rank order of Geosciences for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	0	0
2	3	1
3	5	2
4	6	2
5	2	1
6	8	3
7	10	4
8	21	8
9	45	17
10	69	26
11	96	36

Table 15: Rank order of Calculus for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	4	2
2	8	3
3	5	2
4	2	1
5	7	3
6	10	4
7	34	13
8	36	13
9	46	17
10	58	22
11	55	21

Table 16: Rank order of Statistics for all respondents, 1=most important (n= 265)

<u>Rank</u>	<u>n=</u>	<u>%*</u>
1	9	3
2	13	5
3	26	10
4	30	11
5	25	10
6	31	12
7	36	14
8	27	10
9	24	9
10	23	9
11	21	8

In response to survey question 49: “Are there any other qualities of a biology major that you consider important but were not listed in this survey? If so, please describe.”

Business (n=9)

1. How to seek out and communicate with potential employers, even when a position is not advertised. Resume building within a desired field.
2. No. Note: I put "none" for some of the competence items, to indicate that I have no idea where college graduates fall for these items, since they are not relevant to my field.
3. Taxonomy. Composition - Literature (writing)
4. Things that are searched for in applications each year. Bird ID Plant (+weed) ID Computer/GIS skills. Tractor Operator Experience
5. Note: I answered "none" for the second column of each question because I'm affiliated with an agency, not a university. Advocacy and political activism. Environmental law. Public administration - management of natural resources for the public - agencies have different missions and goals.
6. Geographic Information Systems and computer technologies.
7. Ability to follow a dichotomous key. Physical/field activities and equipment use. Emphasize professionalism, people skills, and communication skills -written and oral.
8. Common sense. Strong work ethic and the ability to change course as needed.
9. They are all listed.

Faculty (n=5)

Minnesota State University Moorhead

1. Experimental design. Modeling.
2. I think you covered it pretty well. However, some questions were hard to answer because we have several "Emphases" within our Biology major, and some emphases stress slightly different competencies to varying degrees.
3. This may have been captured already in one of the listed qualities, but I would say an ability/interest to learn material at a depth that goes beyond what is presented in the classroom. The body of scientific information is continually expanding and in any one course, a student is being exposed to only the very basic content of that area.

North Hennepin Community College

1. Skill in the arts of love and humor.
2. Ability to work in teams.

Alumni (n=16)

Minnesota State University Moorhead

1. Though I earned a biology degree from MSU in 1986, I did not choose an occupation which uses my biology degree on an everyday basis, although I have a deep appreciation for nature and the environment and try to pass these qualities on to my children.

University of Minnesota

1. Having a broad background in all areas of biology before picking a specialized field seems to be something lacking at other Universities. I have felt very well prepared for discussions about ecosystems to genetics where some of my peers in my graduate program clearly specialized too specifically and lack the background to allow for consideration of broader fields.
2. I answered the above questions interpreting my current area of research as a very specific subsection of biology - specifically, the behavioral ecology of humans. You can call it economics if you want. I do a lot of macro and banking research but all of these particular bits of rational (or bounded-rational) behavior are biological in origin.
3. I don't know if this is relevant to this particular survey, but some sort of journal club/scientific reading course would have been a great addition to the CBS curriculum.
4. Computational methods in biological science is an area that has been tremendously important in my post-graduate career, but (I felt) was underrepresented in my undergraduate education. Other than that, the U of M prepared me exceptionally well for PhD study.
5. Patience, ability to overcome failure, ability to learn the facts but at the same time, question the facts but be able to know when facts are true (basically, a fact that is proven may later be disproven, so it's important to know what to consider as true or when to place into question)
6. A greater focus on research methods.
7. I thought CBS does a wonderful job educating towards a biology major.
8. Ability to apply what they have learned to post-graduate education.
9. The University of Minnesota provided a in-depth knowledge on the theory of the biology, but only a few on the application. Also, I think each student should be given a chance to manage at least one research project, because I found most of the fresh biology major graduate do not have adequate or some of them even have none of the laboratory skill. Personally, I think it makes the graduates easier to find jobs and it does help a lot when they are working in the real world.
10. Ability to form good relationships/mentorships with faculty.
11. The ability to make interdisciplinary connections. Understanding ecological models relies on a solid calculus base. Analyzing data relies on a statistics background. Knowing just how important math is would have been a huge advantage as an undergrad. Further emphasis and encouragement in these areas is much needed. They are not just degree requirements, but are very valuable to scientific work.
12. Ability to multitask.
13. Being able to adapt one's career goals instead of following a fixed path (i.e. med school)
14. While it was touched on above, the simple understanding of what you do with biology degrees is important. I knew what I wanted to do, but people with no interest in grad school, med school, or teaching are left wondering what their degree can be used for. In general, CBS does an excellent job of preparing

- students, and the university as a whole has phenomenal resources for everything from career counseling to study abroad programs. However, it is assumed that students will access these resources on their own. I would recommend a system that makes students more aware of everything available to them.
15. Ability to work within and outside of established graduate or professional paths following graduation.

Students (n=29)

Minnesota State University Moorhead

New (n=3)

1. Description of kind of lab work done esp in each subfield of biology.
2. More internship experience required
3. Development and deployment of the inter-relationships and importance between theory, research, and practice

Three Years (n=1)

1. Environmental Science is something I consider to be highly important in my education and not enough classes are offered in these courses. Because so many other classes are required I do not have time to take the Environmental courses that are available even though it is what I want to do with my life

Four Years (n=5)

1. Availability of community observation. Many students in the health and medical emphasis have trouble finding observation opportunities within their future field of study. This observation is often a major requirement for graduate school programs as well as something most students should do to see how their studies apply to what they may choose to do as a career.
2. Being a doctoral student in the health field, I think it is important to emphasize biological differences and emphasizing human biology in the curriculum. I feel as a biology student at MSUM I was having to relate everything to the human body from what we were studying on other organisms. I think human biology should be of greater emphasis in some of the courses. Anatomy wasn't listed on the areas above, and I feel it was vital to my success as a graduate student. I think interpersonal relationships should also be emphasized. One area I have found that wasn't emphasized was relating what we were doing in the classroom to what we would be experiencing in the "real world".
3. Writing and communication skills. Standard Operating Procedures (SOPs).
4. work experience in the field is very important * laboratory experience is extremely important
5. Ability to learn in changing environments...learning while doing research is far different than learning while sitting in a classroom and studying your notes later on. Accountability about knowledge helps me to learn-so papers and poster presentations are a great thing!

Five Years (n=3)

1. Laboratory hands on skills are critical and can be applied across many fields (such as metrology: measurement science in standards and calibrations). Second to laboratory skills, I need and apply mathematics and communications regularly.
2. Need for in depth knowledge of current research and the newest information. Some aspects and subjects are completely meaningless in the real world, and in 99% of the current research being conducted.
3. Microbiology was a course that provided important lab experience, writing skills, and practical applications of science and would have been ranked high in question #48.

University of Minnesota

New (n=6)

1. Respect for moral/religious restrictions on what kinds of research are or are not allowable.
2. A biology major must stress the fact that the major will only be as effective as you use it. It can either lead to great innovations for the world or it can be wasted.
3. I believe it is important that any scientist have some understanding of the philosophers that were studying what is now science.
4. Passion for nature, living organisms and his/her surroundings and a flare for knowledge and discovery.
5. Neuroscience
6. A liking of biology.

One Year (n=1)

1. Preparation to write and evaluate scientific literature is important. This would include learning about the proper and successful composition of grant proposals.

Two Years (n=1)

1. But it's a little bit hard to get a job

Three Years (n=5)

1. Please, for the love of God, do something about the physics program at this school. It is horrible. The teachers are uninterested, confusing, and often times unreasonable. I literally felt that I had to teach myself everything from the book, and I studied a lot but still did poorly on the exams. Although I ended up with a high final grade (due to strong curvature of the course), I don't feel that I learned very much at all, and I definitely don't feel that it was applicable to real-life in any way. A class that claims to teach to biology majors and pre-med student should have some sort of biology reference at some point and (I would have thought this was a given, but apparently not), teach the parts of physics that will specifically show up on the MCAT! I ended up having to

teach myself half the physics material that showed up on the MCAT, when students who had taken the IT physics (which, trust me, is not a better option) that was not specifically for pre-med students, had covered everything that was on the MCAT. * * I have written this sentiment on every survey that CBS has given me, and I truly do hope that someone makes a change to the department or the classes, because having a physics program this awful at an institution such as the University of Minnesota is truly disappointing.

2. Ability to prepare yourself for a professional career (i.e. medical school)
3. Evolution should be mandatory, not an option. I know too many CBS students that still think that saying "Well, it's just a theory" is a valid argument against natural selection. Also, 1002 was a great class. I think we should go back to it - the Foundations series seems like it's too intense for freshmen. I know a lot of sophomores who say they really didn't like it. 1001 and 1002 are really why I stayed a biology major - they were eye-opening and easy, which is what any 'foundational' class should be.
4. The feeling of community and experiences outside of the classroom (such as social building activities, networking activities, volunteering activities, and studying/research abroad) are very important. The College of Biological Sciences at the University of Minnesota gives all of these experiences as more. It is a wonderful college and I wouldn't trade my experience here for anything!
5. The ability to apply knowledge of life sciences to a variety of areas and use the skills involved in scientific inquiry to identify and address problems

Four Years (n=4)

1. The physics requirement for biology majors is not applicable to my major at all. If biology majors need to take physics to broaden their knowledge of science (since physics is a fundamental science), why not require the non-calculus based physics? Why do we have to struggle to get through physics concepts AND struggle through the calculus? We already have to take the classes separately, why make us suffer through it twice? Physics at the University of Minnesota needs some substantial improvements; it is the one aspect of my undergraduate experience that hated. More internship experience required
2. Self motivation. Being able to create and rank broad goals and break them down into how to accomplish those goals. Ability to analyze something small and place it within the context of the big picture. Determining what is best for society as a whole and what is economically practical. Ability to network far and wide across space and differing cultures and backgrounds.
3. At least at the University of Minnesota, biology majors at a variety of different career paths. A person taking a the survey interested in graduate studies and research will likely answer differently than someone looking towards a career in medicine, nursing, or pharmacy. This survey should maybe consider the limitations because of these differences in career objectives of the survey respondents. I could see how this could affect the responses to importance of the "General Competence" questions.

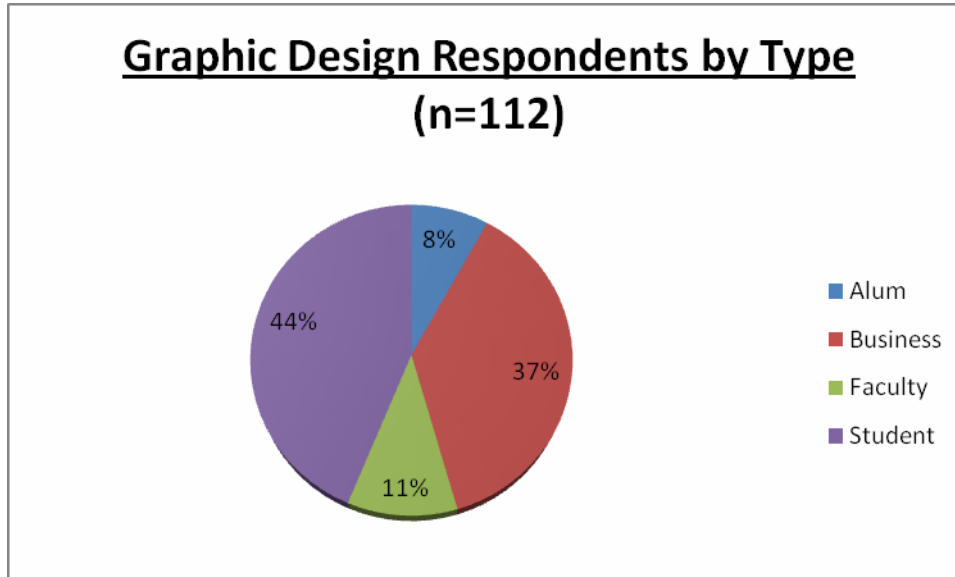
4. CBS needs to require research laboratory experience for a degree to be received. I was shocked this year to learn the number of people who will be graduating with me in a few months that have absolutely zero lab experience. How will they be able to find any sort of biologically related work, or get into any sort of quality graduate or professional school? They will have spent 4-6 years and thousands of dollars for a degree that essentially is worthless and will not get them a real job anywhere. CBS talks and talks and talks to students about getting involved, but I think that a research requirement is necessary to increase the quality of the education that students are receiving and make CBS an elite college. Maybe some sort of student/PI match service would make things easier for students, or if incoming students were required to talk to three different professors (NOT ones teaching their classes) about their research as part of NOL, just to make them more comfortable with putting themselves out there and contacting PhD's. Also, there should be a class similar to NOL (maybe without travel to Itasca) for transfer students, because many of the ones I know have trouble knowing what they have to do to get involved with research. Also, a foreign language should be a required part of a CBS education, even if only 2 semesters are required instead of the 4 semesters CLA requires.
5. The physics requirement for biology majors is not applicable to my major at all. If biology majors need to take physics to broaden their knowledge of science (since physics is a fundamental science), why not require the non-calculus based physics? Why do we have to struggle to get through physics concepts AND struggle through the calculus? We already have to take the classes separately, why make us suffer through it twice? Physics at the University of Minnesota needs some substantial improvements; it is the one aspect of my undergraduate experience that hated. More internship experience required
6. Self motivation. Being able to create and rank broad goals and break them down into how to accomplish those goals. Ability to analyze something small and place it within the context of the big picture. Determining what is best for society as a whole and what is economically practical. Ability to network far and wide across space and differing cultures and backgrounds.
7. At least at the University of Minnesota, biology majors at a variety of different career paths. A person taking a the survey interested in graduate studies and research will likely answer differently than someone looking towards a career in medicine, nursing, or pharmacy. This survey should maybe consider the limitations because of these differences in career objectives of the survey respondents. I could see how this could affect the responses to importance of the "General Competence" questions.
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will not get them a real job anywhere. CBS talks and talks and talks to students about getting involved, but I think that a research requirement is necessary to increase the quality of the education that students are receiving and make CBS an elite college. Maybe some sort of student/PI match service would make things easier for students, or if incoming students were required to talk to three different professors (NOT ones teaching their classes) about their research as part of NOL, just to make them more comfortable with putting themselves out there and contacting PhD's. Also, there should be a class similar to NOL (maybe without travel to Itasca) for transfer students, because many of the ones I know have trouble knowing what they have to do to get involved with research. Also, a foreign language should be a required part of a CBS education, even if only 2 semesters are required instead of the 4 semesters CLA requires.

APPENDIX C: GRAPHIC DESIGN TUNING PROJECT SURVEY RESULTS

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GRAPHIC DESIGN TUNING SURVEY RESPONDENT SUMMARY

- 112 Total Respondents
 - 9 Alums
 - 6 from University of Minnesota
 - 2 from Bemidji State
 - 1 from South Central College
 - 49 Current Students
 - 30 from University of Minnesota
 - 14 from Bemidji State
 - 5 from South Central College
 - 12 Faculty Members
 - 8 from University of Minnesota
 - 3 from Bemidji State
 - 1 from South Central College
 - 42 Business
 - No identification on institutional affiliation
 - Organizational Type
 - Design Firm (12)
 - Exhibit Design Business (5)
 - Marketing (4)
 - Advertising (3)
 - Web Design/Development Business (3)
 - Business Communications Firm (2)
 - Other:
 - Corporate In House Design Group (3)
 - Commercial Printer (3)
 - Book Publisher (1)
 - Corporate Business (1)

- Creative Services-Print/Web Design and Photography (1)
 - Direct Marketing (1)
 - Magazine Publisher (1)
 - University (1)
 - University Department of Recreational Sports (1)
-

GRAPHIC DESIGN GENERAL COMPETENCIES**Table 1: Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)***Importance* (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to undertake research at an appropriate level</i>				<i>Ability to work in an international context**</i>				<i>Ability to communicate in a second language**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	67%	33%	0%	67%	22%	11%	33%	44%	22%	0%
Business (n=42)	5	7	57	31	14	45	36	5	38	45	17	0
Faculty (n=12)	0	0	50	50	0	17	67	17	8	58	33	0
Student (n=49)	2	12	47	39	2	16	57	25	14	33	39	14

Level to which developed

	<i>Ability to undertake research at an appropriate level</i>				<i>Ability to work in an international context</i>				<i>Ability to communicate in a second language</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	11%	78%	11%	11%	56%	22%	11%	78%	11%	11%	0%
Business (n=42)	7	29	45	19	21	52	19	0	55	38	7	0
Faculty (n=12)	0	8	58	33	8	42	50	0	25	67	8	0
Student (n=49)	2	31	51	16	14	37	54	83	45	29	22	4

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to act on the basis of ethical reasoning</i>				<i>Interpersonal and interaction skills</i>				<i>Ability to be critical and self-critical</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	67%	33%	0%	0%	0%	100%	0%	0%	22%	78%
Business (n=42)	2	24	41	33	0	2	14	83	0	2	33	64
Faculty (n=12)	0	0	50	50	0	0	17	83	0	0	8	92
Student (n=49)	0	23	51	41	0	0	25	75	0	2	14	84

Level to which developed

	<i>Ability to act on the basis of ethical reasoning</i>				<i>Interpersonal and interaction skills***</i>				<i>Ability to be critical and self-critical***</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	56%	44%	0%	0%	22%	78%	0%	0%	22%	78%
Business (n=42)	7	31	52	10	7	29	50	14	7	41	36	17
Faculty (n=12)	0	8	58	33	0	0	67	33	0	0	50	50
Student (n=49)	4	33	43	20	2	2	41	55	0	8	25	67

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to search for, process and analyze information from a variety of sources</i>				<i>Ability to communicate both orally and through the written word in native language</i>				<i>Ability to design and manage projects</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	22%	78%	0%	0%	33%	67%	0%	11%	11%	78%
Business (n=42)	0	2	43	55	0	2	31	67	0	2	14	83
Faculty (n=12)	0	0	25	75	0	0	8	92	0	0	8	92
Student (n=49)	0	4	53	43	0	4	35	61	0	33	27	46

Level to which developed

	<i>Ability to search for, process and analyze information from a variety of sources</i>				<i>Ability to communicate both orally and through the written word in native language*</i>				<i>Ability to design and manage projects**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	33%	67%	11%	0%	33%	56%	0%	0%	11%	89%
Business (n=42)	5	21	57	17	5	33	43	19	7	26	38	29
Faculty (n=12)	0	8	75	17	0	17	42	42	0	8	33	58
Student (n=49)	0	47	38	55	2	6	49	43	0	6	33	61

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Determination and perseverance in the tasks given and responsibilities taken</i>				<i>Ability to adapt to and act in new situations</i>				<i>Ability to act with social responsibility and civic awareness</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	0%	100%	0%	11%	33%	56%	0%	22%	67%	11%
Business (n=42)	0	2	29	69	0	7	26	67	2	19	43	36
Faculty (n=12)	0	0	17	83	0	0	25	75	0	8	33	58
Student (n=49)	0	0	31	69	0	8	18	74	0	4	43	53

Level to which developed

	<i>Determination and perseverance in the tasks given and responsibilities taken*</i>				<i>Ability to adapt to and act in new situations**</i>				<i>Ability to act with social responsibility and civic awareness</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	33%	67%	0%	11%	33%	56%	0%	11%	89%	0%
Business (n=42)	5	17	62	17	5	26	60	10	7	17	64	12
Faculty (n=12)	0	8	33	58	0	8	92	0	0	33	25	42
Student (n=49)	0	6	53	41	0	18	47	35	4	20	45	31

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to motivate people and move toward common goals</i>				<i>Ability to identify, pose and resolve problems</i>				<i>Spirit of enterprise, ability to take initiative</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	11%	44%	44%	0%	0%	22%	78%	0%	0%	33%	67%
Business (n=42)	0	7	52	41	0	5	29	67	0	5	31	64
Faculty (n=12)	0	0	83	17	0	0	8	92	0	0	33	67
Student (n=49)	2	8	43	47	0	6	27	67	0	4	32	64

Level to which developed

	<i>Ability to motivate people and move toward common goals**</i>				<i>Ability to identify, pose and resolve problems**</i>				<i>Spirit of enterprise, ability to take initiative</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	11%	56%	33%	0%	0%	56%	44%	0%	22%	33%	44%
Business (n=42)	5	64	29	2	7	29	50	14	5	31	50	14
Faculty (n=12)	0	42	50	8	0	8	42	50	0	8	75	17
Student (n=49)	0	35	39	27	0	8	43	49	0	14	53	33

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to apply knowledge in practical situations</i>				<i>Skills in the use of information and communications technologies</i>				<i>Ability to communicate with non-experts in one's field</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	11%	89%	0%	0%	0%	100%	0%	0%	33%	67%
Business (n=42)	0	2	31	67	0	2	29	69	0	7	38	55
Faculty (n=12)	0	0	8	92	0	0	25	75	0	0	33	67
Student (n=49)	0	2	37	61	0	2	22	76	0	4	29	67

Level to which developed

	<i>Ability to apply knowledge in practical situations**</i>				<i>Skills in the use of information and communications technologies</i>				<i>Ability to communicate with non-experts in one's field**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	11%	89%	0%	0%	22%	78%	0%	0%	44%	56%
Business (n=42)	5	19	55	21	5	14	50	31	5	62	26	7
Faculty (n=12)	0	8	25	67	0	0	25	75	8	33	42	17
Student (n=49)	0	14	51	35	0	14	43	43	0	37	39	25

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Commitment to safety</i>				<i>Ability to show awareness of equal opportunities and gender issues*</i>				<i>Capacity to learn and stay up-to-date with learning</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	56%	33%	11%	0%	0%	22%	78%	0%	0%	11%	89%
Business (n=42)	19	43	29	10	0	5	29	67	0	5	29	67
Faculty (n=12)	17	25	42	17	0	0	8	92	0	0	25	75
Student (n=49)	23	33	43	72	0	6	27	67	0	10	16	74

Level to which developed

	<i>Commitment to safety**</i>				<i>Ability to show awareness of equal opportunities and gender issues***</i>				<i>Capacity to learn and stay up-to-date with learning</i>						
		1	2	3	4		1	2	3	4		1	2	3	4
Alum (n=9)	0%	33%	56%	11%		11%	0%	56%	33%		0%	11%	44%	44%	
Business (n=42)	21	45	31	2		17	29	38	17		5	7	57	31	
Faculty (n=12)	8	33	58	0		0	17	67	17		0	8	33	58	
Student (n=49)	14	22	29	35		8	18	27	47		0	64	37	47	

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Capacity to generate new ideas (creativity)</i>				<i>Ability to evaluate and maintain the quality of work produced</i>				<i>Ability to work in a team</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	11%	89%	0%	0%	11%	89%	0%	11%	22%	67%
Business (n=42)	0	2	14	83	0	2	21	76	0	2	24	74
Faculty (n=12)	0	0	0	100	0	0	8	92	0	0	8	92
Student (n=49)	0	1	10	89	0	0	14	86	2	4	27	67

Level to which developed

	<i>Capacity to generate new ideas (creativity)</i>				<i>Ability to evaluate and maintain the quality of work produced*</i>				<i>Ability to work in a team</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	11%	44%	44%	0%	0%	33%	67%	11%	22%	22%	44%
Business (n=42)	7	10	41	43	7	19	52	21	7	21	36	36
Faculty (n=12)	0	0	50	50	0	0	33	67	0	17	42	42
Student (n=49)	0	6	27	67	0	10	35	55	0	6	45	49

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Commitment to the conservation of the environment*</i>				<i>Knowledge and understanding of the subject area and understanding of the profession</i>				<i>Ability for abstract thinking, analysis and synthesis</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	11%	22%	44%	22%	0%	0%	11%	89%	0%	0%	33%	67%
Business (n=42)	14	33	41	12	0	2	41	57	0	10	43	48
Faculty (n=12)	0	8	67	25	0	0	50	50	0	0	33	67
Student (n=49)	12	14	29	48	0	0	29	71	2	4	35	60

Level to which developed

	<i>Commitment to the conservation of the environment*</i>				<i>Knowledge and understanding of the subject area and understanding of the profession**</i>				<i>Ability for abstract thinking, analysis and synthesis*</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	22%	67%	11%	0%	11%	0%	89%	0%	0%	33%	67%
Business (n=42)	14	38	41	7	15	21	60	14	7	29	43	21
Faculty (n=12)	0	17	67	17	0	8	75	17	0	8	67	25
Student (n=49)	14	25	29	33	0	10	49	41	4	6	51	39

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Ability to work autonomously</i>				<i>Ability to make reasoned decisions</i>				<i>Ability to plan and manage time</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	0%	22%	78%	0%	0%	11%	89%	0%	0%	0%	100%
Business (n=42)	0	5	38	57	0	5	41	55	0	2	21	76
Faculty (n=12)	0	8	33	58	0	0	17	83	0	0	25	75
Student (n=49)	0	57	49	39	0	2	27	71	0	0	8	92

Level to which developed

	<i>Ability to work autonomously*</i>				<i>Ability to make reasoned decisions*</i>				<i>Ability to plan and manage time**</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Alum (n=9)	0%	11%	11%	78%	0%	11%	44%	44%	0%	0%	33%	67%
Business (n=42)	7	26	45	21	5	21	67	7	7	29	52	12
Faculty (n=12)	0	8	50	42	0	8	42	50	0	25	33	42
Student (n=49)	0	18	49	33	0	6	51	43	0	12	39	49

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1 (cont.): Percentage of Graphic Design Respondents by Competencies for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Appreciation of and respect for diversity and multiculturalism</i>			
	1	2	3	4
Alum (n=9)	0%	22%	44%	33%
Business (n=42)	0	36	43	21
Faculty (n=12)	0	8	42	50
Student (n=49)	8	16	31	45

Level to which developed

	<i>Appreciation of and respect for diversity and multiculturalism</i>			
	1	2	3	4
Alum (n=9)	0%	0%	33%	67%
Business (n=42)	7	29	52	12
Faculty (n=12)	0	25	33	42
Student (n=49)	0	12	39	49

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

In response to survey question: “Please rank below the five most important of the previous competencies according to your opinion.”

Table 1: Rank order of most important competencies for all respondents (n= 112)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Capacity to generate new ideas (creativity)	29	26%
Knowledge and understanding of the subject area and understanding of the profession	10	9
Ability to design and manage projects	10	9
Ability to identify, pose and resolve problems	9	8
Interpersonal and interaction skills	6	5
Determination and perseverance in the tasks given and responsibilities taken	5	5
Capacity to learn and stay up-to-date with learning	5	5
Ability to be critical and self-critical	4	4
Ability to apply knowledge in practical situations	4	4
Skills in the use of information and communications technologies	4	4
Spirit of enterprise, ability to take initiative	3	3
Ability to work in a team	3	3
Ability for abstract thinking, analysis and synthesis	3	3
Ability to communicate both orally and through the written word	2	2
Ability to undertake research at an appropriate level	1	1
Ability to search for, process and analyze information from a variety of sources	1	1
Ability to act with social responsibility and civic awareness	1	1
Commitment to safety	1	1
Ability to evaluate and maintain the quality of work produced	1	1

**Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34*

Table 2: Rank order of second most important competencies for all respondents (n= 112)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Capacity to generate new ideas (creativity)	13	12%
Ability to identify, pose and resolve problems	10	9
Ability to design and manage projects	10	9
Ability to work in a team	9	8
Knowledge and understanding of the subject area and understanding of the profession	8	7
Ability to plan and manage time	8	7
Interpersonal and interaction skills	6	5
Skills in the use of information and communications technologies	6	5
Ability for abstract thinking, analysis and synthesis	5	5
Ability to be critical and self-critical	4	4
Ability to communicate both orally and through the written word in native language	4	4
Ability to evaluate and maintain the quality of work produced	4	4
Ability to undertake research at an appropriate level	3	3
Determination and perseverance in the tasks given and responsibilities taken	3	3
Ability to act with social responsibility and civic awareness	3	3
Ability to communicate with non-experts of one's field	3	3
Ability to adapt to and act in new situations	2	2
Ability to work in an international context	1	1
Ability to search for, process and analyze information from a variety of sources	1	1
Ability to motivate people and move toward common goals	1	1
Spirit of enterprise, ability to take initiative	1	1
Ability to apply knowledge in practical situations	1	1
Capacity to learn and stay up-to-date with learning	1	1
Ability to work autonomously	1	1
Ability to make reasoned decisions	1	1

**Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34*

Table 3: Rank order of third most important competencies for all respondents (n= 112)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to work in a team	12	11%
Ability to plan and manage time	12	11
Ability to be critical and self-critical	9	8
Ability to design and manage projects	8	7
Ability to communicate both orally and through the written word in native language	7	6
Ability to communicate with non-experts of one's field	7	6
Capacity to generate new ideas (creativity)	7	6
Ability to evaluate and maintain the quality of work produced	7	6
Ability to identify, pose and resolve problems	6	5
Spirit of enterprise, ability to take initiative	5	5
Interpersonal and interaction skills	4	4
Ability to apply knowledge in practical situations	4	4
Ability for abstract thinking, analysis and synthesis	4	4
Determination and perseverance in the tasks given and responsibilities taken	3	3
Skills in the use of information and communications technologies	3	3
Ability to undertake research at an appropriate level	2	2
Ability to act on the basis of ethical reasoning	2	2
Ability to adapt to and act in new situations	2	2
Capacity to learn and stay up-to-date with learning	2	2
Ability to make reasoned decisions	2	2
Ability to work in an international context	1	1
Ability to search for, process and analyze information from a variety of sources	1	1
Knowledge and understanding of the subject area and understanding of the profession	1	1
Appreciation of and respect for diversity and multiculturalism	1	1

**Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34*

Table 4: Rank order of fourth most important competencies for all respondents (n= 112)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to work in a team	11	10%
Ability to plan and manage time	10	9
Ability to be critical and self-critical	9	8
Ability to identify, pose and resolve problems	8	7
Ability to apply knowledge in practical situations	8	7
Ability to communicate both orally and through the written word in native language	7	6
Ability to design and manage projects	7	6
Capacity to generate new ideas (creativity)	7	6
Interpersonal and interaction skills	5	5
Ability to communicate with non-experts in one's field	5	5
Ability to adapt to and act in new situations	4	4
Spirit of the enterprise, ability to take initiative	4	4
Ability to evaluate and maintain the quality of work produced	4	4
Ability to act on the basis of ethical reasoning	3	3
Ability to show awareness of equal opportunities and gender issues	3	3
Ability for abstract thinking, analysis and synthesis	3	3
Ability to search for process and analyze information from a variety of sources	2	2
Skills in the use of information and communications technologies	2	2
Capacity to learn and stay up-to-date with learning	2	2
Ability to undertake research at an appropriate level	1	1
Ability to work in an international context	1	1
Determination and perseverance in the tasks given and responsibilities taken	1	1
Ability to motivate people and move toward common goals	1	1
Commitment to the conservation of the environment	1	1
Knowledge and understanding of the subject area and understanding of the profession	1	1
Ability to make reasoned decisions	1	1
Appreciation of and respect for diversity and multiculturalism	1	1

*Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34

Table 5: Rank order of fifth most important competencies for all respondents (n= 112)

<u>Competency</u>	<u>n=</u>	<u>%*</u>
Ability to plan and manage time	11	10%
Capacity to learn and stay up-to-date with learning	9	8
Ability to work in a team	9	8
Ability to design and manage projects	8	7
Interpersonal and interaction skills	7	6
Ability to communicate with non-experts of one's field	7	6
Ability to be critical and self-critical	6	5
Ability to adapt to and act in new situations	5	5
Capacity to generate new ideas (creativity)	5	5
Ability to motivate peoples and move toward common goals	4	4
Ability to identify, pose and resolve problems	4	4
Ability to apply knowledge in practical situations	4	4
Knowledge and understanding of the subject area and understanding of the profession	4	4
Ability for abstract thinking, analysis and synthesis	4	4
Skills in the use of information and communications technologies	3	3
Ability to make reasoned decisions	3	3
Ability to search for, process and analyze information from a variety of sources	2	2
Determination and perseverance in the tasks given and responsibilities taken	2	2
Ability to act with social responsibility and civic awareness	2	2
Spirit of enterprise, ability to take initiative	2	2
Ability to work autonomously	2	2
Ability to work in an international context	1	1
Ability to act on the basis of ethical reasoning	1	1
Ability to communicate both orally and through the written word in native language	1	1
Commitment to the conservation of the environment	1	1
Appreciation of and respect for diversity and multiculturalism	1	1

**Percentages will not equal 100% due to rounding and write in options for questions 32, 33, and 34.*

GRAPHIC DESIGN SPECIFIC COMPETENCIES**Table 1: Percentage of Respondents by Graphic Design Competency for Importance and for Level to Which Developed (n=112)***Importance* (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Thinks as a designer</i>				<i>Makes connections within the broader fields of communication and design</i>				<i>Poses and solves problems utilizing design methods</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=9)	0%	0%	11%	89%	0%	0%	44%	56%	0%	0%	22%	78%
Faculty (n=42)	0	2	29	69	0	0	31	69	0	2	21	76
Alum (n=12)	0	0	0	100	0	0	33	67	0	0	0	100
Student (n=49)	0	2	14	84	0	0	22	78	0	4	33	63

Level to which developed

	<i>Thinks as a designer **</i>				<i>Makes connections within the broader fields of communication and design**</i>				<i>Poses and solves problems utilizing design methods</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=9)	0%	11%	0%	89%	0%	33%	33%	33%	0%	0%	44%	56%
Faculty (n=42)	5	12	52	31	5	50	26	19	5	12	60	24
Alum (n=12)	0	0	33	67	0	8	83	8	0	0	42	58
Student (n=39)	0	0	41	59	0	20	53	27	0	14	39	47

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

Table 1: Percentage of Respondents by Graphic Design Competency for Importance and for Level to Which Developed (n=112)

Importance (4=Strong, 3=Considerable, 2=Weak, 1=None)

	<i>Remains current with aesthetic and theoretical ideas in graphic design</i>				<i>Works effectively with both computers and non-electronic media to create, investigate, and experiment</i>				<i>Considers design problems in their historic, cultural, and ethical context*</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=9)	0%	11%	33%	56%	0%	0%	22%	78%	0%	11%	56%	33%
Faculty (n=42)	0	7	36	57	0	5	29	67	2	24	45	29
Alum (n=12)	0	0	67	33	0	0	17	83	0	0	42	58
Student (n=49)	0	2	22	76	0	2	14	84	0	4	33	63

Level to which developed

	<i>Remains current with aesthetic and theoretical ideas in graphic design</i>				<i>Works effectively with both computers and non-electronic media to create, investigate, and experiment</i>				<i>Considers design problems in their historic, cultural, and ethical context*</i>			
	1	2	3	4	1	2	3	4	1	2	3	4
Business (n=9)	0%	0%	67%	33%	0%	22%	22%	56%	0%	11%	89%	0%
Faculty (n=42)	5	14	57	24	5	24	36	36	10	33	43	14
Alum (n=12)	2	8	92	0	0	8	42	50	0	25	75	0
Student (n=39)	3	18	49	31	0	20	33	47	2	25	39	35

Significance of Chi-squared tests of differences between respondent type, importance of competency, and level to which competency is developed: *p<.05, **p<.01, ***p<.001; percentages may not total to 100% due to rounding.

In response to survey question 41: “What are the three most important skills for 2-year design graduates to be successful?”

Alumni (n=5*)

Bemidji State University (n=1)

1. Knowledge & ability to use current software. * Able to work independently. * Basic design knowledge.

South Central College (n=1)

1. Knowledge of current technologies, job searching abilities, contacts and connections in the "real world"

University of Minnesota (n=3)

1. To be successful at what? * Design and typographic literacy; critical thinking; software.
2. Prioritizing, complete understanding of the whole
3. Understand how printers work, send a project like a brochure to a printer to understand the process, more so than just walk through on a tour of a print shop. * * diversify your skills, get away from the computer. Sketch out your ideas first. * * get an internship set up for when you graduate

*Other respondents were eliminated who answered “NA” or “Don’t know didn’t receive a 4-year degree”

Businesses (n=40)

1. I have not hired or worked with new graduates
2. Idea generation, Communication skills, technical skills
3. 2 yrs for a design student is not long enough. Here are the skills anyway: * * 1. Learn to "see" as a designer. * 2. Learn how design affects its users--it's not just about making things look pretty. * 3. Learn how to communicate well orally and written form.
4. Efficient problem solving, quality design, quality creative.
5. Communication skills * Creative ideas to solve problems presented by clients * Ability to use current technology/software proficiently
6. be able to understand what the project is and design appropriately for it, time management, ability to communicate verbally and written
7. Problem solving * Reasoning * Confidence
8. Ability to understand programs and how they work * Being able to see daily list of tasks and manage by priority * Basic understanding of design
9. Ability to follow directions. * 2. Open communication with others in a group. * 3. Be able to say "I made a mistake, let me fix that."
10. Technical and practical understanding of design and its application * Writing and communications skills * Creativity and pride in work/no mistakes
11. Design skills, professionalism, enterprising efforts
12. Solid portfolio, willing to learn, and asks questions.
13. I do not interact with 2 year design students...
14. Know the software. * 2. Produce quality work. * 3. Do it in a timely manner.
15. Creativity, ability to think/problem solve on your feet * 2. Ability to communicate that problem solving through visuals (sketching, 3d, etc) * 3. team player
16. Impressive portfolio * 2. Ability to promote themselves as designer and showcase their skills * 3. Creativity

17. 1. Confidence in Sharing Ideas - being able to share ideas, not being afraid to bring ideas and speak up about them. * 2. Computer Skills - knowing the software programs needed to complete design work. * 3. Communication Skills - being aware of timelines, deadline, being honest in the amount of time design takes. *
18. Skills with current design software * Disciplined work habits (the work computer and work day are for work, not personal entertainment) * Ability to understand the business goal behind the design task.
19. Creativity, communication, internal drive
 - a. understanding the problem, and how to communicate an effective solution * - not relying on gimmicky executional ideas * - not relying so heavily on the computer
20. Knowledge of software * Work as a team * Problem solving
21. willingness to ask questions, ability to learn on their own, ability to adapt to team culture
22. Basic design principals * Basic Business * Typography
23. Ability to self manage time and tasks, communication with peers, ability to adapt skill set.
24. Communication, Interpersonal, Presentation
25. Passion * Dedication * Communication
26. Basic understanding of the importance of communicating with the target audience. * 2. Understanding how to design with typography and its importance to successful design * 3. Research and total immersion into the brand's past, present and potential future.
27. Thorough training in design applications, primarily Adobe Creative Suite 3. * Ability to provide rationale for design and to defend design decisions. * Tenacity.
28. Fully understanding the problem or goal BEFORE developing the proposed solution. * Ability to quickly digest what the customer does or the service being provided. * Working through design ideas on paper - not relying on computer based templates and filters *
29. Programming * Design ability (not the same as having a degree) * out of the box thinking *
30. Ability to recognize the elements of good design and to produce good design * Technical proficiency in print and electronic mediums * A passion for their work
31. Knowledge of the tools, how to successfully apply them to projects (across mediums), and experience in the design process.
32. 1: Verbal and written communication (proper grammar, spelling and punctuation). * * 2: Fluency in graphic design programs (primarily Adobe Creative Suite). * * 3: Interpersonal skills.
33. Ability to work in a team. * Ability to search for, process and analyze information from a variety of sources. *
34. typography; learning design is more than just programs;
35. take constructive criticism * work well with others * ability to generate creative ideas
36. Show up for work on time. Complete assignments on time. Stay within budget.
37. Manage projects in a timely manner * Ability to adapt to change * Take constructive criticism and use it to become a more well rounded designer
38. Working with a team and taking direction. Also, receiving constructive feedback and possibly giving feedback to peers. Dealing with frustrating situations and timelines as well as difficult clients. It is an absolute must that the graduate has exceptional communications skills and presentation skills.
39. Speak intelligently about work, work on a wide range of projects, start or have some real-life design experience
40. The ability to listen to their art director or creative director. * The ability to communicate successfully both verbally and in written applications. * To constantly work on improving each project and each talent/skill set. *

Faculty (n=10)

1. Incredible creative skill * Impeccable craft (especially with typography) * Previous exposure to or experience in a design firm (i.e., a professional internship) *
2. Mastery of computer skills - especially Adobe CS4 * Work ethic and deadline pressures * Communication - written and orally
3. Design foundations * software knowledge * The ability to create effective design solutions
4. Creativity. Determination. Love for the field.
5. Able to articulate their work * 2. Work in a team * 3. self critical
6. Basic application of design principles * 2. Digital Technical Functionality * 3. Understanding of various delivery methods
7. Entrepreneurial skills * Digital skills * Communication skills
8. Initiative *
9. 1. Interpersonal skills and the ability to work well with others. * * 2. Ability to clearly understand design problems and develop a range of creative solutions to those problems. * * 3. Maintain a consistently strong work ethic.
10. problem solving * compositional principles * sensitivity to typography

Students (n=44)

Bemidji State University (n=13)

New (n=5)

1. Know the program/software * 2. Be open to suggestions and change * 3. creativity and listening
3. Time Management, New Fresh Ideas, Working in Teams, Meeting Deadlines
4. Enjoy your work. love what you do
5. Know what your doing

One Year (n=1)

1. creativity, past, present knowledge

Two Years (n=1)

2. Understanding the tools being taught. * * Ability to work in groups with others. * * Time management. *

Three Years (n=4)

1. Motivation, Teamwork, Creativity
2. I am not a 2 year design student.
3. creativity, confidence, and timeliness
4. Motivation, Perseverance, and Confidence.

Four Years (n=2)

1. design history * * hand AND computer skills * * how to work with clients
2. The basics of design, the basics of the programs used.

South Central College (n=5)

New (n=3)

1. Competence with the software/equipment * 2. Creativity * 3. responsibility
2. An overall knowledge of the field from start to finish. * Knowledge of how to design a layout in an appealing way. * Knowledge of the software used in the industry.

3. The ability to think creatively, to manage their time and produce well under deadlines, and to have good communication skills.

One Year (n=1)

1. software familiarity, interpersonal skills, good design aesthetics (eye for detail)

Two Years (n=1)

1. computer skills, knowing the process, communication skills

University of Minnesota (n=26)

New (n= 10)

1. Developing Communication Skills, Sticking to a schedule, thinking on an abstract basis more often
2. Unsure, new to the program.
3. Be creative, able to collaborate and be able to incorporate their ideas into applicable designs.
4. Synthesizing innovative concepts, working together with others, communicating ideas clearly.
5. Creativity * Skill * Understanding what is needed/wanted.
6. Familiarity with programs and career objectives, communication.
7. -ability to create unique and useful ideas * -ability to work in groups * - have an understanding of projects and terms
8. have some experience in the field * the ability to think creatively and outside the box * be able to work with possible clients *
9. I assume they'd be the same as the ones listed in #43.
10. *To have contacts within the design community * *to be up to date with what is current in design * *the ability to communicate effectively with other designers

One Year (n=3)

1. Computer skills, design principles like color, theory, composition, etc, and speaking/communicating.
2. Knowledge and understanding of the subject area and understanding of the profession; ability for abstract thinking, analysis and synthesis; ability to work in a team.
3. Creativity and inspiration.

Two Years (n=5)

1. time management, attention to detail, and creativity
2. 1. be able to create effective work. * * 2. Have good craftsmanship. * * 3. Be able to take criticism as well as critique others' work.
3. time management, working in a group, creative thinking
4. Ability to be creative/innovative, technical skills, time management
5. A higher degree * 2. A higher degree * 3. a higher degree

Three Years (n=4)

1. foundations of design * information technology * social media
2. Knowledge of the Adobe Suite, the ability to critique their own work as well as others, has their own process or way of generating ideas and applying them effectively in their designs.
3. Know the field and know your medium (computer, print, software, etc.)
4. concept-building, web skills, interpersonal skills

Four Years (n=4)

1. Time management * 2. Design software. Print & Web * 3. Produce lots of initial ideas

2. Knowledge of software, networking and teachers that actually give a shit about your work and whether or not you're successful.
 3. Ability to think creatively and design something unique. * The ability to think critically about your work and others. * The ability to work across a variety of design outputs (web, print, interactive)
 4. Collaboration, design reasoning, technical proficiency
-

In response to survey question 42: “What skills are 2-year design students lacking?”

Alumni (n=7)

Bemidji State University (n=1)

1. Less experience in the design process, project management & presentation skills. Just not enough hands on experience in current software, and not as much variety of different programs and processes.

South Central College (n=1)

1. Extended time of study, would be fine with more technical study

University of Minnesota (n=5)

1. I was in a 4 year program, so I can't answer this question well
2. The general course base that a 4-year college offers such as general classes and requirements and more than just the technical skills, but the design-related and the non-design related thinking behind design.
3. Practice, practice, practice (time). Otherwise, I'm not really in a position to judge, since I don't work with 2 year graduates.
4. Understanding of the whole
5. Ability to draw/sketch * * time management skills

Businesses (n=38)

1. The typical design student is a technical designer but lacks the understanding that design is about problem solving and not making things look cool or pretty. Listening and understanding the client's needs and providing a solution to fit those needs.
2. 1. The understanding and appreciation that design is connected to everything we do. I could be math, science, history, language...design plays a role in all of these areas and knowing a little bit about the connections helps designers formulate solid concepts for real client projects. * * 2. Time spent building relationships/networking with design peers. I found these folks to be my greatest allies in learning and the motivation to do better. * * The ability to manage time and estimate projects. * * Client relations. The ability to interact with a real client. Not knowing appropriate questions to ask about a new project. * * Real context. I think many times student designers design things to look pretty rather than accomplish client's real goals. Also, the understanding that well designed pieces can lead to real business results for clients. * * Not being able to write in complete sentences when communicating via e-mail. Not comfortable with oral presentations. * * Critical thinking and problem solving. Design doesn't have to be on

the surface. Real impact can be created when real thought and careful considerations are made for long term results.

3. Efficient problem solving, quality creative
4. Knowledge of traditional design principles and how they apply to design techniques and ideas. You can teach anyone to use a computer, but they need the artistic and creative abilities to be competitive in the design arena.
5. Sometimes the clear communication is lacking as well as understanding what the design project may be about vs. going off in a totally different creative direction. Also the economics/budget assigned to a project (sometimes the creative mind and direction and look what we can do is outside of the budget or scope of the project)
6. Communication * Professionalism to be in front of client * Maturity
7. need to work on design/ production skills
8. 1. Ability to follow directions. * 2. Software competency *
9. Not sure.
10. ability to hear criticism of work and translate it into changes that improve piece/project
11. All around design skills, they seem to be highly specialized as would be expected from a 2 year school.
12. I do not interact with 2 year design students...
13. Maybe a refining of skills? Being able to take what they've learned and apply it to X-area of the industry; print, web, signing, etc. * * each is different, using the same design principles, with a difference in techniques and end goals. But ALL require good design. * * Some students get into a field and throw their principles out the window in a hurry to get the end goal.
14. 1. Sketching skills * 2. most 2-year design graduates cannot communicate professionally via email (terrible spelling and grammar due to constant text messaging) *
15. Interactive and web design skills * 2. Knowledge of how to create intuitive user interfaces * 3. Understanding/application of usability skills in online media
16. Not sure.
17. Perhaps the same as #41
18. Quality of work, not enough focus on an emphasis
 - a well-rounded pool of knowledge to draw from * - experience, that comes with time
19. understanding of printing process * ability to problem solve
20. willingness to ask questions, ability to learn on their own, ability to work within a team, ability to make broader connections, focus
21. Basic Business * Art history
22. ability to communicate effectively (oral, written)
23. Presentation, Trend-forecasting
24. Teachers teaching the same thing year after year rather than be professionals working in the field and being current with trends, etc. AND basic understanding of typography.
25. General business culture experience. Can only be gained with experience.
26. Budget realities and awareness. There are few limitations imposed when working on school projects. * Client meeting skills - How to extract the proper data in order to assemble a proper design solution.
27. programming (they need more than just HTML) * Design ability
28. Written/verbal communication * Focus and commitment

29. Some of the theoretical ideas of design, the larger picture. How to be creative under a deadline. Not enough time spent on new media (interactive, web) and how it can be integrated into a larger, broader communications initiative.
30. 1: Verbal and written communication (proper grammar, spelling and punctuation). * * 2: Follow-through. Taking a design project and then pushing it one or two or three steps farther. * * 3: Commitment to the field.
31. Practical work experience
32. Generally speaking, two year programs teach you how to use programs, not how to design. Learning how to design is far more important.
33. time management
34. Showing up for work on time. Completing assignments on time. Staying within budget.
35. Take constructive criticism and use it to become a more well rounded designer * * Ability to adapt to change: Teachers don't change their mind on assignments given. Clients change their minds daily whether it's because they don't know exactly what they want until they see it or because they just decided that what they want now is better. *
36. Often times I see a lack in presentation skills or general creative discussions or receiving constructive feedback. Working as a team and with other creative individuals like writers, web-designers, interactive ppl, coordinators.
37. Real-life design experience, design from an aesthetic angle that incorporates pop culture and trend analysis. Knowing how to be honest and critique seriously.
38. Patience and work ethic. * A true understanding of design and how it solves problems communicates benefits and moves our world.

Faculty (n =11)

Bemidji State University (n=3)

1. Critical thinking and analysis * Research skills
2. Social / professional skills.
3. Understanding of time management related to budgets * Fully understanding/research of communication problem before executing final design * Presentation/Selling the solution to the client * Full marketing campaigns * managing work within a team

South Central College (n=1)

1. Non-electronic media to create, investigate and experiment * International awareness * Analysis and Synthesis of problems * Production experience with their designs

University of Minnesota (n=7)

1. Impeccable craft (especially with typography) * Previous exposure to or experience in a design firm (i.e., a professional internship)
2. cannot assess
3. Broad-based education, the concept of interdisciplinary, how different fields are inter-related.
4. Broader liberal education skills * in-depth technical knowledge * in-depth aesthetic knowledge * in-depth and practical knowledge of graphic design professional practice *
5. Ability to adapt and act in new situations * 6. Ability to be critical and self-critical
6. 1. Many students lack the natural curiosity that the best designers seem to have. * * 2. Drive and determination to be the best designer they can be.

7. I do not know

Students (n=44)

Bemidji State University (n=11)

New (n=5)

1. 1. One on one: teacher and student * 2. Announce 1 project at a time *
2. broadness and originality
3. People Skills
4. heart * passion exscerince
5. Following along * professor going to fast

One Year (n=1)

1. broader ranges of mass world wide information, technology usage information

Two Years (n=1)

1. Understanding the tools being used so they can start to design correctly and effectively, * *
Time management skills.

Three Years (n=3)

1. Experience, Knowledge, Practice
2. ability to work well in a team and manage time
3. Motivation and time dedication.

Four Years (n=1)

1. Advanced skills. But those do come after the basics.

South Central College (n=5)

New (n=3)

1. I don't know yet. I'm just starting.
2. I don't know as I'm not there yet.
3. Necessary mathematical skills.

One Year (n=1)

1. professionalism

Two Years (n=1)

1. experience, and communication skills

University of Minnesota (n=28)

New (n=10)

1. Group skills, not enough exposure to Design Community
2. Unsure, new to the program.
3. History of design or possibly where the field is going? * Not really sure.
4. I don't know any 2-year design graduates.
5. Practice *
6. not sure
7. I have no idea

8. more experience * learning new technology *
9. I really have no idea.
10. professionalism

One Year (n=3)

1. Communication skills, commitment to the environment,
2. Ability to communicate effectively in a second language, ability to work in an international context.
3. Time management and some skills in computer programs. Also experience as a designer.

Two Years (n=5)

1. To go out of the box and to not be so structured.
2. I'm not sure--I'm not a professional or a graduate.
3. (You can't graduate in 2 years...) but I'd say web design knowledge is number one.
4. broader education
5. A higher degree * 2. A higher degree * 3. a higher degree

Three Years (n=5)

1. unsure
2. ? I don't know what a two year program entails. I only know the U of M's four year plan.
3. A lot of people don't know enough about the Adobe Suite. It's really important to at least know how to use illustrator, Photoshop and InDesign. We use them every day! Also, we are taught nothing about web design.
4. Knowledge of the broader design field, creative initiative.
5. Depth of knowledge in field and practice in whole-picture thinking

Four Years (n=5)

1. HTML & Flash courses. Not enough practice with what's currently being utilized to reach people across the nation. Web advertising.
2. Knowledge of design software, meaningful connections and caring teachers.
3. I do not know
4. The ability to work across a variety of design outputs. * Experience within the field (even work in different classes to get a variety of design experience within class work)
5. Collaboration, design reasoning, technical proficiency

In response to survey question 43: “What are the 3 most important skills for 4-year design graduate to be successful?”

Alumni (n=7)

Bemidji State University (n=2)

1. Ability to use software, and continue to stay on top of upgrades. * * Understanding of principles and elements of design and let them show through in their work. * * Able to present their work to a group of people, accept their constructive criticism and apply it to make the work better.

2. Strong knowledge of current software. * Strong design sense and able to work independently with more responsibility. * Very strong interpersonal skill and presentation skills.

University of Minnesota (n=5)

1. understanding of design theories, history and relevant trends * 2) communication - verbal and visual * 3) creativity and drive to keep learning
 - a. Design, innovative thinking * 2. A true design trained eye for detail and brilliance * 3. A great portfolio and you're not afraid to go out there and do anything it takes to get the best job with your amazing portfolio.
2. Having a great portfolio. Showing lots of versatility. FLUENCY in flash, Dreamweaver, HTML and other online/digital artwork software. SERIOUSLY... I'm a little pissed off at the U of M for not providing more courses that taught these skills, and for not focusing more on them.
3. Design and typographic literacy; software; business acumen.
4. Broad ideas, knowing that there IS a solution
5. Spend more time looking at free lance options. Learn as much as you can about copyright, laws, and contracts. * * Practice setting up contracts, writing proposals for jobs and negotiating prices. * * Have a job/internship lined up at the time or just after graduation. *

Businesses (n=41)

1. I have not hired or worked with new graduates
2. Abstract problem solving, deep understanding of design philosophy, business acumen.
3. The ability to be self-motivated and want to learn new things. The ability to work within a team of peers. Diversify one's skill set across multiply media types.
4. Same as 2 year * * 1. Learn to "see" as a designer. * 2. Learn how design affects its users--it's not just about making things look pretty. * 3. Learn how to communicate well orally and written form.
5. Efficient problem solving, quality design, quality creative.
6. Communication skills * Creative ideas to solve problems presented by clients * Ability to use current technology/software proficiently *
7. the same as a 2 year just at a higher level - a little more attention on working in a team as well as independently
8. Aggressiveness * Personality * Portfolio
9. Strong design skills with an eye for what is good design * Able to juggle multiple projects with moving deadlines * Able to design in real world (with conditions and boundaries)
10. Ability to follow directions. * 2. Open communication with others in a group. * 3. Be able to say "I made a mistake, let me fix that."
11. Technical and practical understanding of design and its application * Writing and communications skills * Creativity and pride in work/no mistakes, critical thinking
12. Design skills, professionalism, enterprising efforts
13. Solid portfolio, willing to learn, and asks questions.
14. 1. being able to think creatively, yet practically when working with clients that are not as knowledgeable in the field of graphic and web design. * * 2. The importance of verbal and written skills are often understated in the design field. Designers that are able to

express themselves both orally and in writing are much more valuable to me than someone that has really strong design talents. * * 3. Having a strong sense of time management and clear career aspirations is important for me to see in a graphic/web designer. The design field is extremely competitive, and I expect my designers to be moving into a professional position out of college rather than settling for freelance projects.

15. Not applicable as I am two-year graduate and don't know what a four-year graduate would have learned. I would think they should focus more on design-team management so they can take the skills they learn in two years and use them effectively to create projects in a group setting.
16. Strong understanding of software needed to design * 2. Sketching and rapid visualization * 3. the drive to succeed (see question 44)
17. Same as 2 year: * 1. Impressive portfolio * 2. Ability to promote themselves as designer and showcase their skills * 3. Creativity
18. 1. Confidence in Sharing Ideas - being able to share ideas, not being afraid to bring ideas and speak up about them. * 2. Computer Skills - knowing the software programs needed to complete design work. * 3. Communication Skills - being aware of timelines, deadline, being honest in the amount of time design takes. *
19. Same as #41
20. Creativity, communication, internal drive
 - understanding the problem, and how to communicate an effective solution *
 - not relying on gimmicky executional ideas *
 - not relying so heavily on the computer
21. Knowledge of software * Work as a team * Problem solving
22. willingness to ask questions, ability to learn on their own, ability to adapt to team culture
23. Basic design principals * Basic Business * Typography
24. Critical thinking, communication skills, self management, creative leadership
25. Presentation, Conceptual, Marketing
26. Same as number 41
27. Basic understanding of the importance of communicating with the target audience. * 2. Understanding how to design with typography and its importance to successful design * 3. Research and total immersion into the brands past, present and potential future.
28. Same as 41, but stronger design sense should be expected.
29. Fully understanding the problem or goal BEFORE developing the proposed solution. * Ability to quickly digest what the customer does or the service being provided. * Working through design ideas on paper - not relying on computer based templates and filters *
30. Outgoing, out of the box thinking. A willingness to learn from those already in the industry, aka to be open-minded to new ideas, but also to not disregard existing tribal knowledge. The existing knowledge isn't necessarily correct, but it needs to be respected before it can be disregarded.
31. Original thinking * Technical proficiency * A passion for their work
32. Knowledge of the tools, how to successfully apply them to projects (across mediums), and experience in the design process. I believe that most of this is taught, though... a more holistic view of the design process with some experience that the different stages of that process.

33. 1: Verbal and written communication (ability to communicate concepts and ideas). * *
2: Fluency in graphic design programs (primarily Adobe Creative Suite). * * 3: Creative problem solving. Recognizing the root "problem" vs. perceived "problem" which comes from a broad-based education beyond a design focus.
34. Some real life work experience - i.e. internship, etc.
35. Understanding that you can't teach real world experience in the classroom, and that's not what school is about. To get real world experience, you have to go into the real world.
36. take constructive criticism * work well with others * ability to generate creative ideas
37. I have not had any experience with 4 yr design graduates.
38. Same as above
39. All items from question 41 and a good understanding and grasp of design techniques and good understanding of the computer programs to produce it in. Also, to take initiative to find answers and inspiration when time is not allotted specifically toward that.
40. finished and polished portfolio, solid and creative personal identity and website with portfolio pieces, communication/interpersonal skills
41. To problem solve and create design solutions that are effective and get results for the client. In other words, understanding the problem and solving it with the end client/user in mind. * * The ability to communicate successfully both verbally and in written applications. * * To work hard, challenge their bosses/managers to challenge their creative thinking and to request time after significant projects with their manager to learn what went well and what they could have done better. Then having the employee recommend what they think the firm they are working for could have done better to have improved the project or process to complete the project. New eyes/ears are very beneficial!

Faculty (n= 12)

Bemidji State University (n=3)

1. Critical thinking and analysis and the ability to apply these skills to design solutions. *
The ability to adapt to and thrive upon change. * Ability to solve problems.
2. Creativity. Determination. Love for the field. Professionalism.
3. Managing the production on time, and under budget within a team. * 2. Importance of research to solve the design problem and the use of the research in selling the solution. *
3. Historical Art and Design

South Central College (n=1)

1. Communication - written and orally * Analysis and synthesis of problems * Mastery of computer skills *

University of Minnesota (n=8)

1. creativity through iterative design process * • problem-solving and opportunity seeking *
• high level of craft in communications media
2. Able to articulate their work * 2. Provide reasoning * 3. critical thinking
3. Adaptability * communication skills * design skills
4. 22. Creativity * 27. Abstract thinking * 14. Identify pose and solve problems. * 6. Ability to be critical and self-critical

5. 1. The ability to be self motivating. * * 2. The ability to communicate with and inspire others. * * 3. Have empathy for all of the team members.
6. Ability to coordinate visual elements to communicate a clear, intelligent concept. * Ability to learn what they need to know in order to create and communicate an intelligent message. * ability to consider the 'user experience'
7. Impeccable craft (especially with typography) * Previous exposure to or experience in a design firm (i.e., a professional internship) * Unique set of skills and/or interests (e.g., screen printing and DJ'ing or letterpress and Swedish culture) *
8. 15, 12, 22

Students (n=41)

Bemidji State University (n=11)

New (n=4)

1. One major project before graduation * 3. Experience in the program/software * 3. References
2. creativity and listening
3. People Skills, Working in Teams, Meeting Deadlines, Time Management
4. ability to do oral presentations

Three Years (n=4)

1. Creative Knowledge: History of Design, Importance of Fads and what is popular, Different mediums such as illustration, computer generating, hands on... * Presentation & Management Skills * Teamwork Skills
2. Be able to present your work and communicate with clients. * Know how to use the software and give clients what they are asking for. *
3. confidence, ability to work well in a team, time management
4. Same as 2-year design graduates: motivation, perseverance, and confidence

Four Years (n=3)

1. art / design theory * * business skills * * advanced experiments / studies
2. student involvement- being involved w/groups associated with your major * * a knack for learning outside the classroom-constantly looking for creative way to design that are not taught in the classroom, by magazines and designer web sites. * * TIME MANAGEMENT-very important to be able to balance multiple projects at once and still be able to hand in quality/creative work
3. Advanced program knowledge, advanced design knowledge, and the ability to solve the problem presented.

South Central College (n=5)

New (n=3)

1. I don't know yet. I'm just starting
2. An advanced knowledge of the field from start to finish. * To know how to design a layout to target a market and attain the desired goal of the layout. * Extensive knowledge of the software used in the industry.

3. The ability to think creatively, to manage their time and produce well under deadlines, and to have good communication skills.

One Year (n=1)

1. research capabilities, keeping up with trends, professionalism

Two Years (n=1)

1. general knowledge, computer skills, communication skills

University of Minnesota (n=25)

New (n=8)

1. Developing Communication Skills, Sticking to a schedule, Internship Experience
2. Communication/selling skills--Need to be able to pitch an idea to someone or a company.
 - * Hard working attitude that allows you to get things done well and in a timely manner.
 - * Innovative ideas, something new.
3. Synthesizing innovative concepts, working together with others, communicating ideas clearly
4. Creativity * Skill * Understanding what is needed/wanted.
5. Up to date with trends, technology, know what they're doing and learn how to work well with others even if they don't see eye to eye.
6. have experience and be confident in the field * have a strong resume * create ideas that are different and new
7. 1] Ability to solve problems creatively & offer new solutions. * 2] Ability to work in teams/groups effectively, & work together towards a common goal. * 3] Ability to present one's own work, defend it, & communicate it to clients.
8. *To have contacts within the design community * *to be up to date with what is current in design * *the ability to communicate effectively with other designers

One Year (n=3)

1. Knowledge of computer programs, design principles, and communication in business.
2. Knowledge and understanding of the subject area and understanding of the profession; ability for abstract thinking, analysis and synthesis; ability to work in a team; and work effectively with both computers and non-electronic media to create, investigate, and experiment.
3. Knowing how to think like a designer, and have the experience

Two Years (n=4)

1. 1. be able to create effective work. * * 2. Have good craftsmanship. * * 3. Be able to take criticism as well as critique others' work.
2. software proficiency, web design knowledge, networking, creativity
3. skilled computer techniques, team working skills, studio skills
4. Technology/Software skills * 2. Design theory * 3. Self Promotion

Three Years (n=5)

1. design foundations * web standards * social media/interactive/informational technology

2. Understanding of computer skills that will be used in a graphic design career. * How to communicate intelligently and effectively both visually and orally. * Being able to work effectively both as a part of a group and individually.
3. -Advanced skills in the Adobe Suite * -Ability to apply their knowledge in practical situations * -Ability to design and manage their own projects
4. Networking, knowledge of technology, understanding of current design trends.
5. Unique and appropriate concept-building, web design skills, communicating concepts in early stages of design

Four Years (n=4)

1. Time management * 2. Design software. Print & Web * 3. Produce lots of initial ideas
2. Working effectively with both computers and non-electronic media, everything doesn't need to be made on the computer. * Ability to persuade non-experts of their field as well as experts in their field to their design solution or way of design. * Ability to work in a team. All designers need to collaborate with others to keep the design in perspective and make sure it is serving its purpose, and no one wants to work with the person who doesn't know how to work in a team, the one that doesn't keep the others in the loop, does what they feel like without discussing it with the team first, taking all the credit for the work of the team, or the one who just has a bad attitude all around.
3. Ability to think creatively and design something unique. * The ability to think critically about your work and others. * The ability to work across a variety of design outputs (web, print, interactive)
4. the ability to think beyond traditional solutions to common problems

Five Years (n=1)

1. collaboration, detail-oriented, technically skilled

In response to survey question 44: “What skills are 4-year design graduates lacking?”

Alumni (n=7)

Bemidji State University (n=2)

1. A wider range of professors who could give input and feedback on their work.
2. Not enough general knowledge of design programs, after gaining specialized training in a certain area of design, other areas suffer. I know designers that excel in say 3D Studio, but have a hard time navigating In Design and vice versa.

University of Minnesota (n=5)

1. Coding, programming and general web based skills. needs to be MUCH more focus here
2. At Minnesota, web design courses, better Adobe program introductory courses, more specialties and related minors (mostly everyone leaves saying they can design for print and a little interactive, some have advertising minors, etc, but there are not a lot of choices for someone who may be interested in product design, industrial design, design for spaces, or other related fields, there's just graphic design.) Also, portfolio review doesn't always filter out the people who should and should not be designing. It's also hard to tell at that level if this career choice is for you, I didn't know until my junior year, a full two semesters after portfolio review if Graphic Design was for me.

3. printing and production processes; business acumen; persuasion and negotiating skill; leadership and consulting skill; organization and time management
4. time
5. Lack of knowledge of the business. * * Lack of freelance ideals, what to charge, how to get jobs, where to look. * * *

Businesses (n=38)

1. I have not hired or worked with new graduates
2. Business acumen.
3. Lack of understanding of basics of design software. Lack of awareness of the world around them. Too focused on application vs. having good working knowledge of several mediums in the field. Not able to see the "big picture" and process raw data into useable design.
4. The ability to manage time and estimate projects. * * Client relations. The ability to interact with a real client. Not knowing appropriate questions to ask about a new project. * * Real context. I think many times student designers design things to look pretty rather than accomplish client's real goals. Also, the understanding that well designed pieces can lead to real business results for clients. * * Not being able to write in complete sentences when communicating via e-mail. Not comfortable with oral presentations. * * Critical thinking and problem solving. Design doesn't have to be on the surface. Real impact can be created when real thought and careful considerations are made for long term results.
5. Efficient problem solving.
6. Time management skills and ability to work under very strict deadlines. Ability to work with clients and be willing to compromise to come up with the best solution for that client.
7. the same as a 2 year -
8. Aggressiveness * Personality * Portfolio
9. Most seem to have some unreal expectation of what they will be doing when they first start out, grunt work. In the beginning it's more about going above and beyond whatever is asked of you. If you have a good portfolio and are always asking for more you'll do fine
10. 1. Ability to follow directions. * 2. Software competency *
11. TECHNICAL KNOWLEDGE, interactive design skills and knowledge
12. ability to hear criticism of work and translate it into changes that improve piece/project
13. Depending on the school, they are lacking usable web experience.
14. Basic verbal and written skills * 2. A clear sense of how the design field functions * 3. Strength in print and web/interactive design. Usually I see strengths in print design, but it's rare that I see a designer possessing both.
15. Again, I am not sure.
16. Recently, I interviewed quite a few 4-year design graduates from Minnesota (BSU) that had great technical skills but terrible interpersonal and/or follow-up skills. They just didn't seem that interested in getting a job. Not aggressive enough, especially in this economic climate. They just seemed content to stay put and not follow-up with my post-interview requests to see more of their portfolio work, etc. very frustrating.
17. Same as 2 year: * 1. Interactive and web design skills * 2. Knowledge of how to create intuitive user interfaces * 3. Understanding/application of usability skills in online media

18. Computer Skills - they have a basic knowledge of the design software programs but seem to be slightly less knowledgeable than 2-year students.
19. Communication skills, presentation ability, experiences outside the university
 - a well-rounded pool of knowledge to draw from * - experience, that comes with time
20. understanding of printing process * ability to problem solve
21. willingness to ask questions, ability to learn on their own, ability to adapt to team culture
22. Basic business skills * Measurement (basic math) * Color space
23. communication skills
24. Presentation, Interpersonal, Business acumen, production processes
 -
25. Teachers teaching the same thing year after year rather than be professionals working in the field and being current with trends, etc. AND basic understanding of typography.
26. Same as 42.
27. Budget realities and awareness. There are few limitations imposed when working on school projects. * Client meeting skills - How to extract the proper data in order to assemble a proper design solution.
28. programming
29. The ability to listen to and understand client needs * Working under the time constraints of a typical work environment.
30. Again, not enough time spent on new media (interactive, web) and how it can be integrated into a larger, broader communications initiative.
31. 1: Real world budgets and time limitations. * * 2: Creative problem solving. Recognizing the root "problem" vs. perceived "problem." * * 3: Time management.
32. Understanding
33. time management
34. Although I do not have any experience with 4 yr graduates, I think there is a trend in this business area to overwhelm bosses and clients with allot of techno-babble. I have yet to see anyone in this field write coherent sentences, or present a discussion on paper in an intelligent manner.
35. Same as above * * the student I used as an intern did not take criticism well. She acted as though she could do no wrong and if we thought a change was need we were wrong in thinking so. Working with her was a struggle.
36. I often see 4yrs lack same as 2yrs. So it would be the same answer in question 42. Lack in presentation skills and feedback skill. Many students coming out of 4yr degree think that their designs should make it all the way through the design process without changing anything and this is just not true. They need to be able to take feedback, work with a team of other people (writers, web staff, and coordinators) and to adapt/change their designs as needed and not to get extremely attached to their own designs.
37. Talk about work within various contexts, real-world experience, digital/web portfolio content
38. Patience and understanding that the market is tough and not always glamorous. * * To think strategically. * * To research, problem solve and sketch out solutions on paper BEFORE heading to the computer.

Faculty (n=11)

Bemidji State University (n=3)

1. Real-world experience
2. Real-world experience.
3. Creating new standards of communication media * Analysis of research * * *

South Central College (n=1)

1. Proper use of the individual software * Deadline pressures * Production experience with their designs

University of Minnesota (n=7)

1. Exposure to other creative disciplines * • facility with three-dimensional forms and materials * • better sense of initiative, risk-taking
2. 1.knowledge transfer and apply to different situations *
3. in-depth knowledge of gd professional practice * Knowledge of areas of specialization in gd practice * Teaching experience
4. Ability to be critical and self-critical
5. 1. The ability to be self critical. * * 2. The Ability for abstract thinking, analysis and synthesis. * * 3. The Ability to plan and manage their time.
6. ability to see how design can be one important solution to broader social issues * * commitment to detail, precision
7. Incredible creative skill

Students (n=25)*Bemidji State University (n=7)*

New (n=4)

1. One-on-one: student and teacher *
2. broadness and originality
3. People Skills, Interview Skills, Work Ethic
4. non oral presentations

One Year (n=1)

1. variety

Three Years (n=1)

1. Real world experience, such as printing work through an actual printing press rather than in house. It is recommended, but not required.

Four Years (n=1)

1. Real world advice-you're prepared with skill sets throughout college but rarely do they tell you the harsh truths about the job industry. * *

South Central College (n=2)

One Year (n=1)

1. patience with other people in the field with less knowledge

Two Years (n=1)

1. experience in the field

University of Minnesota (n=16)

New (n=4)

1. Direct Involvement in Design Community
2. Possibly how to market their materials. Or knowing what they exactly what they want to do with their degree, or what sort of jobs they would like in their field.
3. 4-year graduates may be lacking in some real-world experiences, depending on the internships they take, but honestly I'm not quite sure.
4. professionalism

One Year (n= 2)

1. Ethical and gender concerns, Multicultural viewpoints.
2. Shouldn't lack skills

Two Years (n=2)

1. Basic technical skills! Some people are not experienced when they enter the program!
2. Technology/Software skills * 2. Technology/Software skills * 3. Self Promotion

Three Years (n=4)

1. web standards/front end development *
2. I am in my third year and still don't know or have the slightest idea of what I can expect when I graduate. I think raising a better awareness of what jobs are out there and what graphic designers are currently doing.
3. A lot of people don't know web design.
4. web skills and utilizing traditional tools

Four Years (n=3)

1. HTML & Flash courses. Not enough practice with what's currently being utilized to reach people across the nation. Web advertising.
2. Currently, from this design program the web and interactive side of design is not supported at all in any of the required classes.
3. presentation skills to get these non-traditional solutions out to the world, business sense

Five Years (n=1)

1. production of work to make it into a tangible form; from computer to paper

In response to survey question 45: “What specific skills and/or knowledge do you expect from a 4-year design graduate that you would not expect from a 2-year design graduate?”

Alumni (n=7)

Bemidji State University (n=2)

1. Larger and more perfected portfolio. Wide range of software knowledge and capabilities. More confidence in their work and what they are capable of.
2. A broader range of knowledge in design, better able to multitask and complete various deadlines.

University of Minnesota (n=5)

1. A deeper development of design theory, history, trends, designers. * also more general experience when it comes to design development, critique, ability to successfully and efficiently identify a design problem/need, and coming up with the best design to address that problem/need
2. A deeper design thinking process and understanding. More than just knowing the Adobe programs, but using them as just tools to create your design. A deeper cultural understanding and also an understanding of fields beyond your own.
3. Advanced typographic skill; advanced design skill; maturity; understanding of the research process; marketing and audience; facility with software and presentation; advanced critical analysis skill
4. Projected thinking, how can your design affect, or be affected by the people, group, person etc. interacting with it.
5. The knowledge of the business, the ability to talk, negotiates and understands contracts. By the 4th year the students are pretty comfortable with designing and the classes and critiques get redundant by now. More time and focus should be on the business side of design meanwhile these business classes should count as Gen Ed requirements so design students don't have to take double the business and management classes.

Businesses (n=41)

1. I have not hired or worked with new graduates
2. Business acumen, Understanding of designs role in business, and a real ability to present work for internal review and for customer review.
3. I have not worked w/ anyone w/ just a 2-year degree.
4. The student being more grounded and worldly.
5. Greater knowledge regarding the industry, communications theories and more experience with applications.
6. Better communication skills. More proficient in a wider variety of software and design tools, or at least a better familiarity with a number of different technologies. More confidence and refinement in their own design skills.
7. A little more business maturity and more developed creative concepts
8. Maturity * confidence * polish * portfolio * more worldly
9. More skills with type design and color * More skills with design programs
10. A higher level of professionalism and broader software knowledge base when it comes to designing and solving problems competently.
11. Higher critical thinking, better at working in groups, better communication and writing skills, greater leadership ability, more precise and less supervision necessary
12. Project management, ability to manage up
13. I would expect them to be more well rounded and have a better overall design foundation.
14. I can't speak to this question with any knowledge since I do not interact with 2 year design students...
15. I think they should have the ability to do more abstract thinking, have more ability to lead in a team setting and be very sure in their design strategies.
16. Mastery of 3D design software. * The drive to get a job and succeed.
17. More sophisticated design sense. Deeper knowledge of typography, color and other design fundamentals.
18. Honestly, the 2-year students we've received from Alexandria Technical College have been more qualified than the 4-year students we've interviewed. So I do not expect more from a 4-year grad student.

19. The ability to do higher level project management. * * * NOTE: The survey requires me (an employer) to complete the "Competence of College Graduates" section above. I find this very hard to do since I've only hired 1 design person from the U. Also, it seems like a better area for recent graduates to address.
20. Broader talent of work, a little more polished in presentation/communication
21. Personally, I expect nothing less of a 2-year than a 4-year student. And I expect nothing more from a 4-year than a 2-year. I might anticipate a better book from a 4-year student, but I've been proven wrong a few times with great books from 2-year students. In the end, the amount of schooling should not (and does not) matter.
22. None. The expectations are the same.
23. Willingness to ask questions, ability to learn on their own, ability to adapt to team culture * * I gotta say - WHAT IS WITH THESE QUESTIONS? this is the most poorly written & designed survey I've ever seen, and I usually love taking surveys. "Level to which developed by College or University Degree" - really? You can almost see the masters thesis behind this survey. * * Whoever you are, your data will be skewed, because who's gonna answer these ridiculous questions? They somehow manage to be way too generic and way too nitpicky. * * "Thinking of yourself as a recent graphics designer, please rate on a scale of 1-7 which of the following competencies are required for you to be successful in the field of life?" * *
24. Internship (hands on experience) * Design theory
25. Advanced communication skills
26. Robust knowledge of design network and market factors
27. It shouldn't matter how many year's you have been at it. It is all about your work and how you can sell it and yourself to a potential client or employer.
28. More advanced thinking in both theory and in application. * * I clicked NONE on all of the college answers because we are a business, a book publisher, so I thought that column did not apply. Hope that's OK
29. A basic maturity as a result of the additional two years of incubation.
30. Leadership and management abilities. The ability to job into a higher roll straight from school. Some management knowledge. * * In addition better design and programming skills
31. Broader base of knowledge in subjects not directly related to design training * Better verbal and written communication skills * Greater creativity and innovation in problem solving
32. I think that with a 4-year graduate, they would have had more time to apply their knowledge during group projects, having had opportunities to work at different parts of the design process, discussed design theories, and would exit with a more detailed, holistic view of and approach to design.
33. 1: Creative problem solving. Recognizing the root "problem" vs. perceived "problem." * * 2: Commitment to the field as a career. * * 3: Liberal Arts education
34. A sense of confidence.
35. A greater, overall understanding of design that comes from having those two extra years in school.
36. More creative thinking ability, more attention to detail
37. More managerial experience. The ability to see the whole picture of how graphics arts impact the effectiveness of a company in terms of cost/benefit analysis.
38. A better feel for the work force. I think a 4-year design student should have at least 2 internship prior to entering the work force. That experience not only will help with their design skills and thought process in school but also prepare them for what is will be like in a real work environment.
39. I would expect a 4yr to understand design theory, typography and some history. I would expect the 4yr to have more program/computer knowledge and have better presentation skills as well as a better, well-rounded understanding of design.

40. Polished portfolio with varied projects, better ability to talk about work, usage of web/digital media
41. Excel with all the Creative Suite programs. * * Excellent type knowledge (history to type designers) and how type can make or break a project's success. * * Lack of understanding of how projects work in the real world and what clients understanding of design is.

Faculty (n=12)

Bemidji State University (n=3)

1. More in depth analysis, synthesis. * More research skills. * Increased ability to make broader connections.
2. Professional skills. Mastery of more software programs. More life experience.
3. Production management, "on time and under budget" * Creative management * Greater understanding of the client and audience's point of view in communication problem.

South Central College (n=1)

1. The ability to apply the depth and breadth of the Liberal Arts viewpoints to various design issues. The 4-year graduate's critical thinking, analytical and synthesis skills should be much more advanced than a 2-year graduate AND should be much more internationally and multiculturally in tune within the graphic design profession.

University of Minnesota (n=8)

1. Strong critical reasoning * Ability to go beyond the expected and push a design further than was required * Managing multiple projects with overlapping deadlines
2. Breadth of liberal education knowledge; advanced critical skills; advanced communication skills
3. More conceptual thinking, ability to integrate science, humanities, business into designing * • better writing, planning, presenting skills * • a more evolved personal style
4. 1. Better communication skills (writings and verbal) * 2. Broader sense of liberal education * 3. better international experience (study abroad)
5. Broad understanding of cultural and social issues in graphic design practice * Interdisciplinary practice * Working in teams * Research skills * Project management skills
6. 40. Cultural context * 38. Remains current with ideas * 14. Identify pose and solve problems.
7. 1. A broader understanding of the graphic design profession. * * 2. Design solutions that considered in a historical, cultural, and ethical context.
8. Ability to apply a broad range of thinking, from the humanities and sciences, to their approach to design. * * increased ability to synthesize research and apply to their design * * ability to consider both the broad and specific context of a design problem *

Students (n=47)

Bemidji State University (n=13)

New (n=4)

1. Experience
2. Program knowledge and how the audience reacts to certain ads
3. More of a concept of ideas, Good people skills, an ability to meet deadlines, produce work at the same or higher level, developing a harder work ethic, multitasking
4. ability to do an oral presentation and have enough confidence in yourself to do it

One Year (n=1)

1. Be quicker on ideas, production, final project

Two Years (n=1)

1. I would expect cleaner design; I would expect the design to be more culturally significant.

Three Years (n=4)

1. I believe that in a four year program you have a bit more time and training to gather the skills needed to be successful. I believe that taking the general classes helps out in that as well as simply having those extra years to get comfortable as a designer and how to work the programs and computers. I don't think that I'd feel comfortable being thrown into the design world with only two years under my belt. I feel that being in a four year program has given me more confidence and knowledge about the design world.
2. Have a lot more experience with software, working with clients, working in groups, presentation skills, bigger/better portfolio, and ready for on the job work.
3. Being able to stand up in front of a group of clients and being confident and selling your idea and being proud of what you have created
4. More experience, a better grasp of design concepts, more thorough training in software, and a bigger portfolio.

Four Years (n=3)

1. In depth computer skills along with methods other than digital means (such as hand done elements) * * more knowledge of art / design history * * *
2. I would say the opportunity to have access to more technological and educational devices in order to help you get through college. You would think a 4 yr. institution would be better off in terms of having more equipment for students to use to get the most out of their time there. * * also, just a more general in depth understanding of your material...rather than fitting it basic information that everyone knows about design, you're allowed to go deeper into subjects because you are there for a longer period of time!
3. Advanced knowledge on programs and design specific. That stuff usually comes later as ones own knowledge of the subject gets better.

South Central College (n=5)

New (n=3)

1. Advanced skills in all areas of graphic design and production.
2. I would expect a 2 year graduate to be able to do the basics, where a 4 year graduate should have expertise in the area.
3. More fine art experience and introduction to more possible on-the-job projects.

One Year (n=1)

1. Applied field study

Two Years (n=1)

1. A more thorough knowledge of the subject

University of Minnesota (n=29)

New (n=10)

1. More in-depth analysis, broader and more specialized lessons
2. Unsure, new to the program.
3. More technical skill and knowledge.

4. Higher technical ability, and a deeper general understanding and education backing their ideas.
5. A more in-depth study of what a designer does and has done in the past.
6. Up to date with trends, technology, know what they're doing and learn how to work well with others even if they don't see eye to eye. More experiences.
7. A higher understanding and overall greater competence of what design is, how it works, how I work, what jobs I can find; I want to build a great portfolio and expand my horizons in many different directions.
8. I would expect a 4 year graduate to be overall more knowledgeable and more experienced and trustworthy verses a 2 year student
9. I would expect a more in-depth look at the inner workings of design & design thinking. Things like design process models, history of design, appreciation; I wouldn't expect some things like that from a 2-year education.
10. *To have contacts within the design community * *to be up to date with what is current in design * *the ability to communicate affectively with other designers

One Year (n=3)

1. More extensive knowledge, business knowledge.
2. Ability to communicate in a second language; consider design problems in their historical, cultural and ethical context; think as a designer; work effectively with both computers and non-electronic media to create, investigate and experiment.
3. To be more fluent at thinking like a designer, to be more experienced in the field, and have a better sense of what I really want to do. * I don't fully know what I want to do.

Two Years (n=5)

1. Way more skill and design experience
2. I'm not sure--I'm not a professional or a graduate.
3. A more varied education on different mediums and ways to go about designing
4. Ability to apply graphic design into any field, to think critically and creatively, and to have fine arts skills as well
5. I would expect a 4 year design graduate to have more design theory knowledge AND a higher level of skill in software and current technology. (During a past 2 year CERTIFICATE program, I developed extremely good software skills AND a pretty good dose of design theory. In the 4 year program that I am in now, I am learning almost nothing but design theory - gaining absolutely no software skills. I will actually be less qualified in the area of technology and software after this program than I was before I started it.)

Three Years (n=5)

1. Web basics and application courses
2. ? Maybe a deeper understanding of computer programs.
3. The ability to design and manage their own projects
4. Better personal design sense, more technically developed, knowledge of field/ local are/design scene.
5. Patience and ability to come up with the most relevant, conceptually sound designs based on study of historical communications and existing aesthetics.

Four Years (n=5)

1. While I think both programs should cover everything from print, web, ethics, process, and Creative Suite lessons, the 4-year plan should be a lot more thorough. Learning all of these things completely could take 6 years, but it's all a question of how much time is spent on each topic. Ethics and web design would be a little unexpected, come to think of it, from a 2-year design degree.

2. To be honest, I don't think there's much more to be gained from Minnesota's 4 year program than any other 2 year program except possibly more debt. Either you can design or you can't. I have some friends in 2 year programs. The main difference in those programs is that you aren't loaded down with bullshit courses like the University of Minnesota's 4 year program makes you take. In sum, 4 year programs should offer many more beneficial design courses over their 2 year counterparts, but the only 4 year program I've been in, the University of Minnesota's, does not.
3. More advanced level of skills and knowledge that the 2-year graduates received.
4. I am not sure.
5. More of a veteran in the field. They should know more about client interaction and how the live design process works from situation to situation. There is never one way of doing things, but ways of streamlining and being more efficient all the while keeping the design fresh and relevant.

Five Years (n=1)

1. To be better able to work in teams, more refined technical knowledge

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