

Matthew T. Brehm

**Analog or Digital:
Gathering Student Points of View**

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Introduction

In teaching design communication, judgments must be made regarding the amount of time and type of emphasis given to particular methods of expression. This is especially true with regard to analog and digital approaches to design communication. The majority of these judgments are made by individual instructors, who are guided by personal experience and by researching the work of other educators. The judgments are made, in part, by faculty committees responsible for establishing curricular requirements in response to National Architectural Accreditation Board (NAAB) student performance criteria. Students rarely have any input into these decisions, except as written comments in course evaluations after the fact. In order to be more certain that our teaching methods and emphases are reaching their targets effectively, student points of view regarding design communication must be taken into account. If instructors assume that students arrive at school as a clean slate or, worse, if they assume certain established skills and cultural make-up, then their teaching strategies may lack the appropriate focus. This study attempts to establish a method for determining student points of view with regard to design communication issues, and in particular those issues regarding digital and analog methods of communication.

To ask students about their experiences and opinions regarding design communication methods, I administered an anonymous survey to architecture students at the University of Idaho. In March 2005 I conducted a pilot study, and in March 2008, I gathered a significant number of additional responses. My aim was to develop a framework through which the questions could be posed and data collected in a rigorous way. This paper presents the survey results gathered to date, as well as brief analysis of the findings.

The Survey

The survey was organized into four sections, with the first gathering basic demographic data and the second focused on childhood. The third section asks questions about respondents' high school years and the fourth gets into college-level issues. The survey ends with a few questions about what students anticipate in the profession. The two surveys have yielded an enormous amount of data – far more than I was able to comment upon for this paper. In hope of eliciting feedback on the survey as a whole as well as on specific questions, what follows are the results of both surveys with percentage values associated with responses. A total of 53 responses were gathered in March 2005, and 201 responses in March 2008. In cases where responses allowed “Check all that apply,” the percentages for each choice listed are a percent of the total number of respondents, such that they typically add up to more than 100%.

Part I

1. What is your age?

2005	#	%	2008	#	%
17	0	0	17	1	0.5
18	0	0	18	17	9
19	7	13	19	28	14
20	8	15	20	37	18
21	4	8	21	24	12
22	5	9	22	26	13
23	7	13	23	21	10
24	6	11	24	19	9
25	3	6	25	6	3
26	2	4	26	2	1
27	2	4	27	6	3
28	1	2	28	0	0
29	2	4	29	2	1
30	3	6	30	1	0.5
31	0	0	31	2	1
32	0	0	32	2	1
34	0	0	34	2	1
35	0	0	35	2	1
38	2	4	38	1	0.5
39	0	0	39	1	0.5
40	1	2	40	0	0
45	0	0	45	1	0.5
Total	53	100	Total	201	100

2. What is your gender?

2005	#	%	2008	#	%
Female	20	38	Female	79	39
Male	33	62	Male	122	61

3. Where did you grow up?

2005	#	%	2008	#	%
Idaho	27	51	Idaho	106	53
Utah	4	7.5	Washington	28	14
Alaska	4	7.5	Oregon	16	8
Washington	3	6	Alaska	11	5.5
California	3	6	California	8	4
Oregon	2	4	Nevada	6	3
Nevada	2	4	Utah	4	2
Montana	2	4	Montana	3	1.5
			Colorado	2	1
			Minnesota	2	1
Other	6	11	Other	12	6
Total	53	100	Total	201	100
One student each from Arizona, Colorado Japan, Maine, Maryland, and Ohio.			One student each from Florida, Illinois, Iran, Louisiana, Mexico, North Carolina, New Mexico, Ohio, South Africa, South Dakota, Tanzania, and Viet Nam.		

4. Are any of your immediate family members architects, designers or artists?

2005	#	%	2008	#	%
Yes	14	26	Yes	36	18
No	39	74	No	165	82

4a. If you answered "yes," please specify their relationship to you and their profession.

Students apparently overlooked the word "immediate" in the question, as several answers included reference to uncles, aunts, cousins, and grandparents. Including these responses in the data, the answers varied, with 15 students being related to architects, designers, landscape architects, and interior designers. 10 students were related to artists, photographers, or art teachers, and 3 students were related to engineers.

Part II

For the following questions, assume that the phrase “as a child” means the years prior to entering high school.

5. *Did you consider yourself to be more “artistic” than others as a child?*

2005	#	%	2008	#	%
Yes	32	60	Yes	136	68
No	21	40	No	65	32

6. *Did your family or peers think of you as being more “artistic” than others?*

2005	#	%	2008	#	%
Yes	39	74	Yes	156	78
No	14	26	No	45	22

6a. *If you answered “yes,” how often did they encourage your artistic inclinations?*

2005	#	%	2008	#	%
Very Often	11	21	Very Often	35	17.5
Often	11	21	Often	72	36
Occasionally	14	26	Occasionally	43	21
Rarely	3	6	Rarely	12	6
Never	0	0	Never	1	0.5
NA	14	26	NA	38	19

7. *How often did you draw, sketch, or paint by hand as a child?*

2005	#	%	2008	#	%
Very Often	7	13	Very Often	38	19
Often	21	40	Often	69	34
Occasionally	20	38	Occasionally	58	29
Rarely	5	9	Rarely	31	15
Never	0	0	Never	5	3

8. How often did you use a computer as a child?

2005	#	%	2008	#	%
Very Often	3	6	Very Often	22	11
Often	8	15	Often	63	31
Occasionally	19	36	Occasionally	52	26
Rarely	13	24	Rarely	42	21
Never	10	19	Never	22	11

9. How often did you play video games as a child?

2005	#	%	2008	#	%
Very Often	3	6	Very Often	25	13
Often	13	25	Often	37	18
Occasionally	8	15	Occasionally	65	32
Rarely	22	41	Rarely	50	25
Never	7	13	Never	24	12

Part III

The following questions are focused on your experiences in high school.

10. Approximately how many students were in your high school's graduating class?

2005	#	2008	#
Minumum	0 (home-schooled?)	Minumum	0 (home-schooled?)
Maximum	950	Maximum	1525
Median	300	Median	270
Mean	340	Mean	289

11. Did you take art or drawing classes in high school?

2005	#	%	2008	#	%
Yes	43	81	Yes	164	82
No	10	19	No	37	18

11a. If you answered "yes," what type of media were these classes focused on?

2005	#	%	2008	#	%
Analog	28	53	Analog	99	49
Digital	2	4	Digital	11	6
Both	13	24	Both	54	27
NA	10	19	NA	37	18

11b. If you answered "Analog," what specific media did you use?

2005	#	%	2008	#	%
Pencil	36	68	Pencil	139	69
Pen & Ink	26	49	Pen & Ink	109	54
Watercolor	11	21	Watercolor	76	38
Oils	10	19	Oils	56	28
Acrylics	18	34	Acrylics	85	42
Collage	16	30	Collage	73	36
Clay	23	43	Clay	84	42
Wood	11	21	Wood	39	19
Markers	14	26	Markers	59	29
Photography	8	15	Photography	41	20
Other	16	30	Other	26	13

11c. If you answered "Digital," what specific programs did you use?

2005	#	%	2008	#	%
ArchiCAD	2	4	ArchiCAD	7	3.5
AutoCAD	12	23	AutoCAD	55	27
SketchUp	1	2	SketchUp	7	3.5
Form-Z	0	0	Form-Z	1	0.5
3dStudioMax	4	8	3dStudioMax	11	5.5
Maya	0	0	Maya	3	1.5
Rhino	0	0	Rhino	11	5.5
PowerCAD	0	0	PowerCAD	0	0
MiniCAD	0	0	MiniCAD	1	0.5
VectorWorks	0	0	VectorWorks	0	0
Other	4	8	Other	25	12

12. Did you take any drafting classes in high school?

2005	#	%	2008	#	%
Yes	31	58	Yes	101	50
No	22	42	No	100	50

12a. If you answered "yes," what types of tools were these classes focused on?

2005	#	%	2008	#	%
Analog	7	13	Analog	20	10
Digital	7	13	Digital	31	16
Both	17	32	Both	51	25
NA	22	42	NA	99	49

12b. If you answered "Digital," what specific programs did you use?

2005	#	%	2008	#	%
ArchiCAD	2	4	ArchiCAD	4	2
AutoCAD	19	36	AutoCAD	73	36
SketchUp	0	0	SketchUp	3	1.5
Form-Z	0	0	Form-Z	1	0.5
3dStudioMax	3	6	3dStudioMax	6	3
Maya	0	0	Maya	0	0
Rhino	1	2	Rhino	13	6.5
PowerCAD	0	0	PowerCAD	0	0
MiniCAD	0	0	MiniCAD	1	0.5
VectorWorks	0	0	VectorWorks	0	0
Other	6	12	Other	13	6.5

Part IV

The following questions are focused on your experiences at the university level, and your expectations for professional work.

13. *What year are you now completing in school?*

2005	#	%	2008	#	%
First	2	4	First	37	18
Second	13	24	Second	49	24
Third	11	21	Third	42	21
Fourth	12	23	Fourth	29	15
Fifth or more	15	28	Fifth or more	44	22

14. *How many design studios have you completed?*

2005	#	%	2008	#	%
Less than 2	3	6	Less than 2	58	29
2 – 3	17	32	2 – 3	63	31
4 – 5	10	19	4 – 5	31	15
6 – 7	13	24	6 – 7	21	11
8 or more	10	19	8 or more	28	14

15. *How many focused graphics classes (outside design studios) have you completed?*

2005	#	%	2008	#	%
Less than 2	16	30	Less than 2	84	42
2 – 3	25	47	2 – 3	65	32
4 – 5	6	11	4 – 5	35	17
6 – 7	3	6	6 – 7	12	6
8 or more	3	6	8 or more	5	3

16. How often do you draw, sketch, or paint by hand in your free time (that is, not specifically for a class)?

2005	#	%	2008	#	%
Very Often	0	0	Very Often	5	2.5
Often	6	11	Often	37	18
Occasionally	24	45	Occasionally	88	44
Rarely	21	40	Rarely	66	33
Never	2	4	Never	5	2.5

17. How often do you play video games?

2005	#	%	2008	#	%
Very Often	0	0	Very Often	1	0.5
Often	6	11	Often	18	9
Occasionally	24	45	Occasionally	36	18
Rarely	21	40	Rarely	75	37
Never	2	4	Never	71	35.5

18. Have you taken any non-required courses in analog graphics?

2005	#	%	2008	#	%
Yes	31	58	Yes	90	45
No	22	42	No	111	55

19. Have you taken any non-required courses in digital graphics?

2005	#	%	2008	#	%
Yes	20	38	Yes	63	31
No	33	62	No	138	69

20. How satisfied are you thus far with your training in analog design communication?

2005	#	%	2008	#	%
Very Satisfied	8	15	Very Satisfied	20	10
Satisfied	21	40	Satisfied	91	45
Neutral	12	23	Neutral	61	30
Unsatisfied	12	23	Unsatisfied	27	14
Very Unsatisfied	0	0	Very Unsatisfied	2	1

21. How satisfied are you thus far with your training in digital design communication?

2005	#	%	2008	#	%
Very Satisfied	3	6	Very Satisfied	10	5
Satisfied	28	53	Satisfied	41	20
Neutral	11	21	Neutral	73	36
Unsatisfied	11	21	Unsatisfied	57	28
Very Unsatisfied	0	0	Very Unsatisfied	15	8
NA	0	0	NA	5	3

22. How much focused training in analog design communication do you think is sufficient for architecture students?

2005	#	%	2008	#	%
1 course	3	6	1 course	5	3
2 courses	7	13	2 courses	24	12
3 courses	16	30	3 courses	72	36
4 courses	16	30	4 courses	61	30
5 or more	11	21	5 or more	39	19

23. How much focused training in digital design communication do you think is sufficient for architecture students?

2005	#	%	2008	#	%
1 course	1	2	1 course	4	2
2 courses	7	13	2 courses	13	7
3 courses	17	32	3 courses	59	29
4 courses	11	21	4 courses	71	35
5 or more	17	32	5 or more	54	27

24. What tools do you use most often for general design tasks?

2005	#	%	2008	#	%
Analog	9	17	Analog	71	35
Digital	10	19	Digital	19	9.5
Both	34	64	Both	108	54
NA	0	0	NA	3	1.5

24a. If you answered "Analog," what media do you typically use?

2005	#	%	2008	#	%
Pencil	36	68	Pencil	152	76
Pen & Ink	37	70	Pen & Ink	149	74
Watercolor	5	9	Watercolor	24	12
Oils	2	4	Oils	8	4
Acrylics	2	4	Acrylics	18	9
Collage	5	9	Collage	26	13
Clay	6	11	Clay	7	3.5
Wood	17	32	Wood	36	18
Markers	14	26	Markers	79	39
Photography	24	45	Photography	58	29
Other	9	17	Other	22	11

24b. If you answered "Digital," what programs do you typically use?

2005	#	%	2008	#	%
ArchiCAD	3	6	ArchiCAD	8	4
AutoCAD	41	77	AutoCAD	107	53
SketchUp	16	30	SketchUp	82	41
Form-Z	0	0	Form-Z	0	0
3dStudioMax	32	60	3dStudioMax	49	24
Maya	0	0	Maya	1	0.5
Rhino	2	4	Rhino	33	16
PowerCAD	0	0	PowerCAD	0	0
MiniCAD	0	0	MiniCAD	0	0
VectorWorks	0	0	VectorWorks	1	0.5
Photoshop	39	74	Photoshop	118	59
InDesign	7	13	InDesign	32	16
Pagemaker	0	0	Pagemaker	1	0.5
Illustrator	20	38	Illustrator	30	15
Other	4	8	Other	19	9.5

25. How often do you create images that combine digital and analog tools?

2005	#	%	2008	#	%
Very Often	8	15	Very Often	25	13
Often	12	23	Often	43	21
Occasionally	21	39	Occasionally	56	28
Rarely	10	19	Rarely	42	21
Never	2	4	Never	35	17

26. Typically, how satisfied are you with images and models you create by hand?

2005	#	%	2008	#	%
Very Satisfied	5	9	Very Satisfied	19	9
Satisfied	31	59	Satisfied	104	52
Neutral	10	19	Neutral	49	24
Unsatisfied	7	13	Unsatisfied	26	13
Very Unsatisfied	0	0	Very Unsatisfied	3	2

27. If you are not "very satisfied," what do you feel is lacking in your work?

(Written responses discussed below.)

28. Typically, how satisfied are you with images you create with digital tools?

2005	#	%	2008	#	%
Very Satisfied	2	4	Very Satisfied	22	11
Satisfied	38	72	Satisfied	82	41
Neutral	10	19	Neutral	54	27
Unsatisfied	3	5	Unsatisfied	23	11
Very Unsatisfied	0		Very Unsatisfied	7	4
NA	0	0	NA	13	6

29. If you are not "very satisfied," what do you feel is lacking in your images?

(Written responses discussed below.)

30. Typically, how satisfied are you with images you create by combining analog and digital tools?

2005	#	%	2008	#	%
Very Satisfied	10	19	Very Satisfied	21	10.5
Satisfied	27	51	Satisfied	74	37
Neutral	12	23	Neutral	68	34
Unsatisfied	4	7	Unsatisfied	6	3
Very Unsatisfied	0	0	Very Unsatisfied	4	2
NA	0	0	NA	27	13.5

31. If you are not "very satisfied," what do you feel is lacking in your images?

(Written responses discussed below.)

32. What appeals to you most about analog design communication?

(Written responses discussed below.)

33. What appeals to you most about digital design communication?

(Written responses discussed below.)

34. When you graduate, how strong do you expect your analog design skills to be?

2005	#	%	2008	#	%
Very Strong	7	13	Very Strong	66	33
Strong	20	38	Strong	71	35
Sufficient	21	40	Sufficient	53	26
Marginal	4	7	Marginal	9	5
Weak	1	2	Weak	2	1

34a. When you enter the profession, how often do you expect to use your analog design skills?

2005	#	%	2008	#	%
Very Often	4	8	Very Often	38	19
Often	22	41	Often	73	36
Occasionally	19	36	Occasionally	73	36
Rarely	7	13	Rarely	17	9
Never	1	2	Never	0	0

35. When you graduate, how strong do you expect your digital design skills to be?

2005	#	%	2008	#	%
Very Strong	18	34	Very Strong	82	41
Strong	25	47	Strong	75	37
Sufficient	8	15	Sufficient	40	20
Marginal	2	4	Marginal	4	2
Weak	0	0	Weak	0	0

35a. When you enter the profession, how often do you expect to use your digital design skills?

2005	#	%	2008	#	%
Very Often	32	60	Very Often	125	62
Often	19	36	Often	63	31
Occasionally	2	4	Occasionally	11	6
Rarely	0	0	Rarely	2	1
Never	0	0	Never	0	0

Written Responses

The written responses to Questions 27, 29, 31, 32, and 33 yielded many thoughtful comments. Trends became apparent, with several phrases or themes being repeated by numerous students. Some selected examples are presented here from three of the questions, with responses from both 2005 and 2008 being combined – although, if there was a noticeable change in views from the 2005 survey to the 2008 survey, this has been identified.

Question 29: “If you are not ‘very satisfied’ [with images created with digital tools], what do you feel is lacking in your work?”

Of the 174 students who provided an answer (69% of the total), 76 students (44% of responses) mentioned a perceived lack of skill or knowledge of the specific tools being used. This might be expected among responses from younger students, but such a distinction is not evident – students at all levels apparently feel this way. Many students wrote about the quality of the results they experience: “renderings seem a bit canned” ... “the images are a little cold and not as lively as I would like” ... “images are often too static” ... “lacks evidence of the creative touch of the designer” ... “[lacks] the beauty of a hand drawing” ... “I find myself settling for mediocre images” ... “[lacks] originality.” Speed was not mentioned, perhaps because students feel stymied by the complexity of the tools offered in digital design software. They cite the “awesome” amount of tools available to them as a positive, and at the same time they frequently mention that having so many available tools prevents a thorough understanding of use or expertise with particular tools.

Question 32: “What appeals to you most about analog design communication?”

The most frequent responses had to do with analog tools providing a “hands-on” relationship to the work, and the quickness or speed with which ideas can be explored (37 responses in each case). “Freedom” (to create and express ideas) or “lack of restrictions and/or limits” was mentioned 35 times – noticeably more often in 2008 than in 2005, and more often by the more advanced students. A greater “personal connection” to the work was cited in 27 responses, and the “artistic” or “human” nature of the work was cited in 20 and 18 responses, respectively. Students mentioned that they feel a “better sense of ownership” and that they “become more involved” in the work they’re doing by hand. “Expression” or “expressiveness” was mentioned in 22 responses. “Beauty,” “character,” “life,” or simply that “it looks better” were qualities mentioned frequently. The “relaxing” or “calming” nature of drawing by hand was noted by 5 respondents. One student wrote that “being able to crush the paper and throw it away” was a great advantage, and another wrote that analog graphics provide for “more ‘wow’ factor” than digital images.

Question 33: “What appeals to you most about digital design communication?”

Thirty-two responses mentioned “realism” or some variation on that theme, followed closely by “accuracy” with 31 responses, and “precision” with 21 responses. Twenty-five students mentioned the “speed” or “quickness” with which they can investigate options, create massing models, and pull together presentations using digital tools – though this was more commonly mentioned in the 2005 survey. Nineteen students cited qualities of “cleanliness,” “accuracy,” and “profes-

sionalism,” while 12 students wrote about the ease of making changes, often citing “the ‘undo’ button” as a tool that allows them to “try new things and go out on a limb” in the design process. While a few students wrote about digital images appearing “more realistic” than manual images, words such as “beauty,” “personality,” “freedom,” and “expression” were entirely absent in response to this question – in stark contrast to the responses for Question 32.

Correlations

In addition to the direct responses to survey questions, I looked at correlations between questions that might suggest trends not immediately evident in the basic results. The results from selected questions were evaluated in relation to the results of other questions. Approaching the basic data in this way yields an enormous amount of information, so I was forced to be selective about which questions to correlate. Twenty-nine pairs of questions were examined in this way, and six correlations were selected as examples for this paper.

A simple, and perhaps self-evident, example is seen in Figure 1, where responses to Question 5 were correlated with responses to Question 16. Those who answered “Yes” to Question 5 were plotted alongside those who answered “No,” according to how they answered Question 16. The result of this correlation shows that those who considered themselves to be more ‘artistic’ than others as a child are somewhat more likely to draw, sketch, or paint by hand in their free time.

Figure 2 shows the relationship between computer use as a child and media choices in college. Surprisingly, those who used computers “often” or “very often” as children were more likely to answer “analog” or “both” in response to Q24. Those who responded “never” were evenly split between “analog” and “both,” while those who used computers “occasionally” or “rarely” as children were more likely to answer “both.”

Figure 3 shows the relationship between gender and whether students played video games as a child. Video games are of interest because they involve a type of graphic, and often spatial, interaction with computers, and because they have become very common in the recreational lives of students. The questions about video games are perhaps too general, as distinctions could be made in the types of games most often played, and whether or not they involve virtual three-dimensional spaces, role-playing, environment modification, etc. Nonetheless, the data shows a clear difference between males and females in the frequency with which they played video games, and Figure 4 shows that, while students generally play video games less now than they did as children, this decrease is a bit more pronounced in the female respondents.

Figure 5 shows that those who draw by hand in their free time are more likely to be “satisfied” or “very satisfied” with their efforts in manual communication. While this might seem to be a self-evident or logical conclusion, the data lends greater credence to the notion that sketching outside

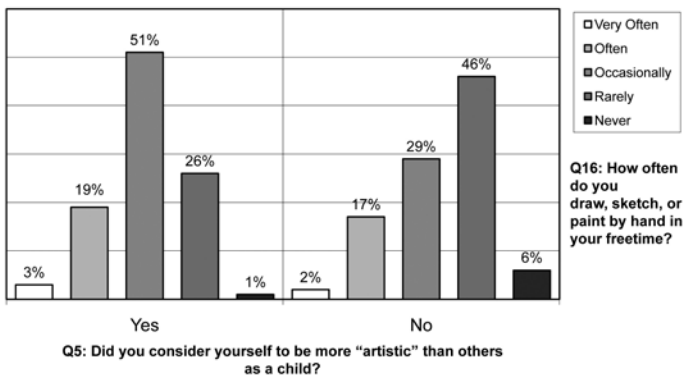


Figure 1
Response to Q16, based on response to Q5.

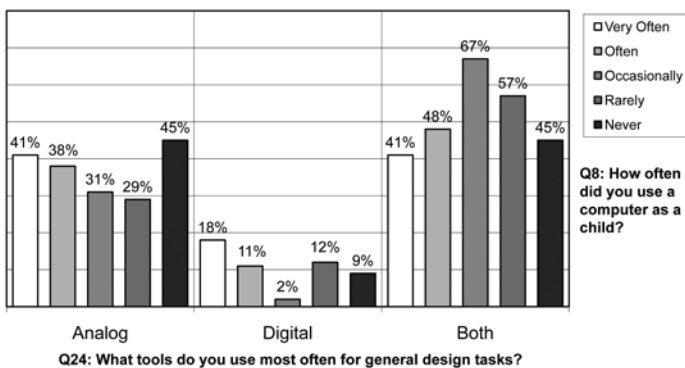


Figure 2
Response to Q24, based on response to Q8.

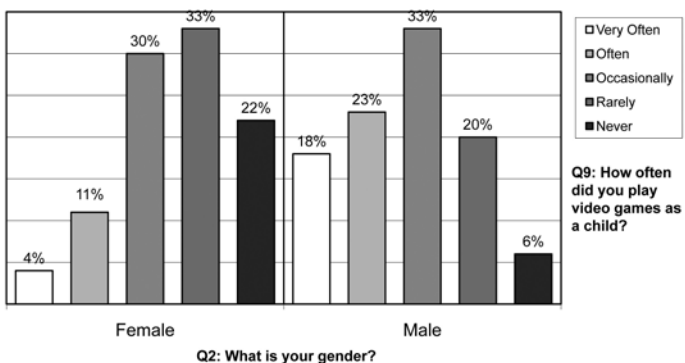


Figure 3
Response to Q9, based on response to Q2.

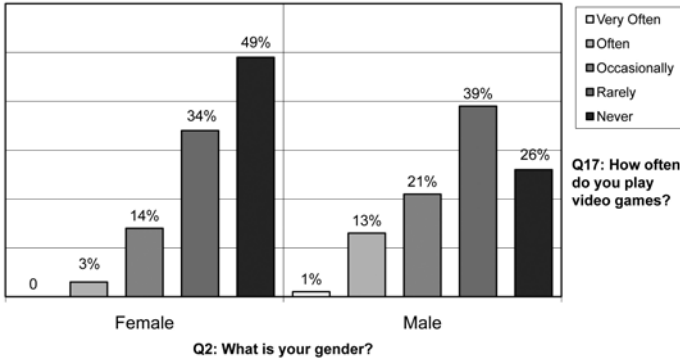


Figure 4
Response to Q17, based on response to Q2.

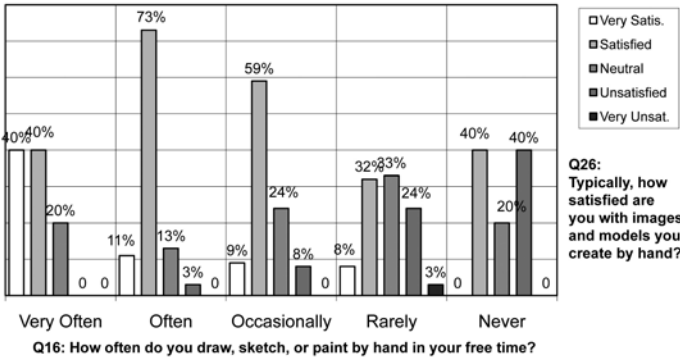


Figure 5
Response to Q26, based on response to Q16.

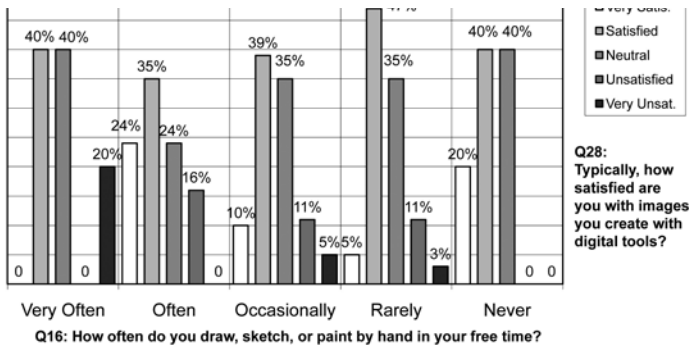


Figure 6
Response to Q28, based on response to Q16.

of class will lead to more satisfaction with images created by hand in the design studio. Comparing Figure 5 with Figure 6, it appears that those who never sketch in their free time are equally “satisfied” or “neutral” whether they use manual or digital tools. 20% of those who sketch very often are “very unsatisfied” with their digital work, while 20% who never sketch are “very satisfied.” The group that appears to be most satisfied across the board are those who sketch often.

The potential combinations of questions are many and varied. These examples are provided to give some indication of how the basic survey data might be further interpreted to give insights not immediately evident from the direct responses.

Conclusion

This paper presents a method for understanding student points of view regarding design communication, and in particular the choices made by students regarding digital and analog design methods. Because the respondents were all from a single university, and because the total number of respondents remains fairly small (254 total), making definitive statements is not possible. While I have made note of interesting findings in the data gathered, these findings are merely indications that the method is viable. Refinements to the survey, and gathering data from a larger pool of respondents over time, will make it possible to comment more clearly on student opinions. Web-based versions of the survey might help to establish a larger sample, as well as providing a more automated method for data collection and analysis.

One refinement to the survey, or the way it is administered, would be to group respondents more clearly. Those just entering a degree program could be surveyed as a group, and those about to graduate. Surveying former students, perhaps a year or two out of school, would provide a sense of how professional experience influences opinion.

The present study is limited to a portion of students at only one university. Further research that widens the sampling of respondents and compares regional samples would potentially show variations. If variations exist that relate to geographic or university-specific settings, perhaps the survey could be tailored more expressly to regional differences.

The results of this survey potentially raise more questions than they answer, but as an initial study, this paper proposes a method for gathering and analyzing data relevant to the teaching of design communication. If the method is deemed worthwhile, it will adjust accordingly and further studies of this type will be conducted. I wish that data such as this had been recorded ten, twenty, or thirty years ago. It would be interesting to compare student points of view as they may have changed over time, and having ‘control’ data dating to before the advent of computers would likely provide a worthwhile basis to begin analysis of contemporary findings. However, we’re still undergoing significant changes in the availability of tools and the applications of methods for design communication. Looking ahead, even the data collected for this paper may become more valuable as similar studies are conducted in the future.