
Visuospatial Thinking in the Professional Writing Classroom

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Abstract

It has been suggested that teaching professional writing students how to think visually can improve their ability to design visual texts. This article extends this suggestion and explores how the ability to think visuospatially influenced students' success at designing visual texts in a small upper-division class on visual communication. Although all the students received the same instruction, students who demonstrated higher spatial faculties were more successful at developing and designing visual materials than were the other students in the class. This result suggests that the ability to think visuospatially is advantageous for learning how to communicate visually and that teaching students to think visuospatially should be a primary instructional focus to maximize all student learning.

Keywords

visuospatial thinking, document design, visual literacy, visual communication, learning styles

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For over two decades, many scholars have called for instructors to pay attention to visuals and the visual composition of documents in the writing classroom (Bernhardt, 1986; Brumberger, 2005, 2007a, 2007b; Handa, 2004; Kostelnick & Roberts, 1998; Kress, 1999; Schriver, 1997). This call has been fueled in part by the idea that images and visual design elements not only communicate meaning independent of text but construct meaning in a way that is inherently different from text (Daley, 2003; Kress, 2009; Messaris, 1994). Portewig (2004) has consolidated these various calls for increased attention to the visual into what she designated a “visual literacy” approach to instruction. *Visual literacy* is largely viewed as a learned skill that consists of the ability to both understand and use visual and graphical elements in order to communicate (Debes, 1969, cited in Messaris & Moriarty, 2005; Dondis, 1973; Fransecky & Debes, 1972; Seels, 1994). The ease with which a person acquires visual literacy, like other types of skills, likely depends on that person’s learning characteristics, including cognitive abilities such as spatial manipulation of information and verbal intelligence.

In this article, we examine the potential relationship between people’s visuospatial learning characteristics and their ability to perform document-design tasks successfully. We then use our findings to suggest changes in how visual literacy is taught in the professional writing classroom. But first we describe how visual literacy instruction is currently included in professional writing curricula and suggest ways to foster visual thinking in the classroom.

Visual Literacy in Professional Writing Curricula

In professional writing (both business and technical communication) classrooms, visual literacy is most commonly realized through attention to document design and the visual presentation of a text. *Document design* is a process by which arguments are developed and made through the synthesis of words and pictures (see Schriver, 1997, for a discussion of the differences between alternative terms for document design, e.g., information design and communication design). Professional writing is dominated more than ever by the composition of visual and multimodal texts, which are characterized by mixed logics (visual and verbal) that are brought together through a combination of modes, such as images, text, and color (Kress, 2005). For example, a survey of working professional communicators found that visual communication abilities are essential to their daily work (Brumberger, 2007a). Specifically, 78% of professional communicators design documents as part of their jobs, 72% design layouts or other visual content, and

76% create or modify images for inclusion in documents. These findings show the relative frequency and complexity of visual communication tasks that are routinely performed by professional communicators—tasks that require a fluency in visual and verbal thinking as well as an understanding of design principles and tools.

Unfortunately, existing visual instruction has not kept pace with the heavy visual demands that are typical of the work professional writing students do after they graduate. In fact, professional writing classes typically dedicate 20% or less of class time to visual communication, with almost a third of these classes dedicating 10% or less. And most business communication (and related) programs have not historically required a course in visual communication or even recommended it as an elective (Brumberger, 2005). This represents a fundamental disconnect between the focus of instruction and the demands of the workplace.

Professional writing courses and textbooks characteristically teach document design from a rhetorical tradition (as opposed to a craft or romantic approach, see Schriver, 1997) that emphasizes the importance of purpose, context, and the needs of an audience in a communicative situation. And professional communication instruction generally emphasizes a laundry list of design principles (e.g., consistency, repetition, alignment, contrast, balance, and color) that students must learn and apply to the design of their documents (e.g., Baker, 2006). But because rhetoric (from a writing studies background) has traditionally been based so heavily in verbal content, the visual components of a document tend to remain subservient to the written words. This tendency fails to recognize the power that visuals have to communicate meaning differently from words (e.g., Birdsell & Groarke, 2004; Kress, 2009; Messaris, 1994), but more important, it privileges verbal thinking. This verbal focus also downplays the level of visual thinking students must develop in order to successfully fulfill their jobs as professional communicators.

Fostering Visual Thinking in the Classroom

To help students see a document as a composition of visual patterns that build meaning and encourage students to move beyond focusing exclusively on the verbal information, instructors should foster visual thinking in the classroom (Brumberger, 2007b). Such visual thinking entails “the intuitive and intellectual process of visual idea generation and problem solving” and “an active and analytical process of perceiving, interpreting, and producing visual messages” in a way that is as sophisticated and purposeful

as using verbal language (p. 380). When students can recognize the relationship between visual elements and patterns, they may be more effective at using visual language (including images, symbols, colors, shapes, etc.) to compose messages in sophisticated, and nonverbal, ways.

Fostering visual thinking in the classroom is critical because doing so encourages students to go beyond using visuals simply to illustrate verbal points and prompts them to explore how visuals and design elements themselves communicate meaningfully. This exploration forces students to develop a mental agility to work with both visual and verbal information cohesively. But the instructor's ability to help students develop this mental agility may depend, in part, on students' cognitive abilities. For example, the ease with which students mentally manipulate and comprehend spatial principles can profoundly influence their acquisition of this type of visual thinking.

When teaching design, instructors may struggle to provide feedback to some students who seem to understand by rote the design principles but are unable to appropriately apply them. In contrast, other students, in the same class, who receive the same instruction, are somehow able to apply the principles in dynamic and cohesive ways. Given that the instruction and curriculum is identical for these students, what enables one group to outperform another?

One explanation for these performance differences might be the inherent capacities that each learner brings to the learning arena. Students' underlying faculties likely influence the ease with which they learn abstract visual principles and subsequently use them in their designs. Differences in learning trajectories have been well established in the history of research on intelligence (Carroll, 1993), so it follows that students of professional communication would not all learn (and design) in the same way. Naturally, our instruction would be further beneficial if we would consider those differences and how they relate to a student's success at designing documents effectively.

For a long time, researchers have used learner aptitudes as a predictor of how well a person can learn and complete complex tasks. Prominent examples include Binet's (1916) early work on identifying the need for alternative instruction in French schoolchildren, the U.S. military's massive efforts (starting in World War I and continuing to this day) to test incoming soldiers' aptitude for handling different responsibilities (Yerkes, 1921), and the human-resource testing used frequently in today's workplace (Sternberg, 1996). One learner aptitude that is reliably identified as critical in any discussion of learner characteristics is the ability to manipulate,

maintain, and manage spatial information, commonly referred to as *visuospatial ability*. The concept of visuospatial ability has been consistently differentiated from the broader concepts of “general intelligence” and verbal ability and thus been identified as an independent and critical facet of our cognitive function (Carroll, 1993).

Differences in visuospatial abilities have been shown to uniquely predict performance of several complex tasks (for a review, see Hegarty & Waller, 2006). Specifically, these differences most strongly predict performance of tasks that require explicit visuospatial processing, such as mechanical reasoning (Hegarty & Sims, 1994; Hegarty & Steinhoff, 1997) or learning a route on a map (Sanchez & Branaghan, 2009). And these performance differences are not isolated to interactions with the external environment. For example, visuospatial ability has also been found to predict the comprehension of narrative texts in which readers must follow the actions of a character in physical space (Bower & Morrow, 1990; Fincher-Kiefer, 2001; Fincher-Kiefer & D’Agostino, 2004; Haenggi, Kintsch, & Gernsbacher, 1995). Thus, visuospatial ability seems especially relevant for understanding how to develop and use space. Specifically, visual design and visual literacy should rely heavily on this ability, given the very spatial nature of design itself.

In relation to visual arts, Gardner (1983) described visuospatial intelligence as a sensitivity to composition, including “an enhanced capacity to appreciate the whole” and discern patterns among diverse elements (p. 204). Gardner further classified visuospatial intelligence as a metaphoric ability to “discern similarities across diverse domains,” describing the ability to compose a document in a way that ties together seemingly unrelated items or ideas (e.g., an image and an essential element of an argument). This ability corresponds with Arnheim’s (1969) notion that visual aspects be used to capture the “essentials of theme” (p. 117) rather than to literally translate the material.

Thus, the goal of this study is to determine the extent to which students’ visuospatial ability relates to their ultimate success in designing visual documents. We seek not only to pursue this general relationship between design and spatial ability but also to explicate how differences in visuospatial ability manifest themselves in specific aspects of a design. In other words, we explore how visuospatial ability influences visual design and examine the design characteristics for which this ability is most relevant. Identifying these sensitive areas will permit us to suggest ways to supplement design instruction that may help low-spatial thinkers overcome difficulties in achieving design success. In this initial study, we tested students’

performances on two design tasks in a small visual communication class and related these performances to differences in visuospatial ability. In doing so, we also considered aspects of previous course work and experience with a wide variety of design activities and programs.

Current Study

To evaluate the importance of students' spatial faculties in learning design, we conducted an exploratory study during a semester in a Principles of Visual Communication class that is cross-listed as an upper-level undergraduate and graduate-level course. This study was conducted with institutional review board approval following our university's regulations for conducting human-subjects research. The class introduces students to the principles and theories of visual communication and document design and includes topics such as typography, page layout, image and photography, color, and informational graphics. Textbooks for the course included Williams's (2008) *Non-Designer's Design Book*, Berger's (2008) *Seeing is Believing*, and Eiseman's (2006) *Color: Messages and Meanings*, and selected readings were also assigned (e.g., Lipton, 2002; Schriver, 1997; Tufte, 1997; Vande Berg, Wenner, & Gronbeck, 2004; Williams & Tolette, 2007). Students participated in class discussions and completed assignments that required them to both analyze and produce visuals and visual documents.

We examined the performance of six high- and six low-visuospatial students (based on our initial testing). These 12 participants had diverse majors, including technical communication ($n = 5$), history ($n = 2$), communication ($n = 2$), sculpture ($n = 1$), publishing ($n = 1$), and dance ($n = 1$). Although our sample is small, it provided an opportunity to analyze, both qualitatively and quantitatively, the potential impact of spatial abilities on learning.

All participants completed a preliminary demographic questionnaire (PDQ) that we distributed on the first day of class and collected a few days later. The questionnaire asked students about their previous design course work (number of design courses) and experience with a wide variety of design activities and software programs typically used in design (i.e., Adobe[®] Photoshop[®], Microsoft[®] Publisher[®], etc.).

All students also completed the VZ-2 paper-folding test (French, Ekstrom, & Price, 1963). The VZ-2 task has been used extensively as a measure of visuospatial thinking and has been deemed a reliable and valid measure of this ability (French et al., 1963; Hegarty & Waller, 2006; Kane

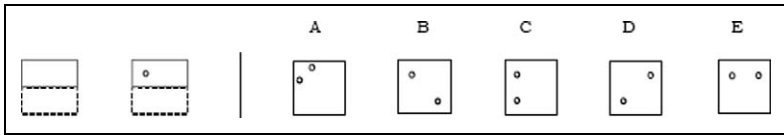


Figure 1. Sample Item From VZ-2

et al., 2004). The VZ-2 task consists of two sets of 10 trials in which the participant is shown a diagram of an irregularly folded piece of paper, with all the requisite folds marked. Participants are told to imagine a single hole being punched through all the layers of paper at an indicated point and then to choose between five possible responses of what the paper would look like if it were completely unfolded. Participants are given 3 minutes to complete each of the two sets. Their final score on this test was their number of correct responses (see Figure 1 for a trial from this task). Overall, this task takes approximately 10 minutes to complete. After the semester was over, participants were assigned to the high- or low-spatial-thinking group according to their score on this task. As such, participants identified as low in spatial ability ($M = 8.17$, $SD = 1.47$) performed significantly worse on the paper folding task than did participants identified as high in spatial ability, $M = 15.17$, $SD = 1.47$; $F(1, 10) = 67.85$, $p < .01$.

To simply and consistently assess students' design abilities throughout the semester, we compared each student's performance on a midterm design and a final posttest assignment given at the end of the semester. Each assignment was a one-page poster that provided a contained forum in which students could apply design principles and focus on graphics and text equally but in a way that promotes their integration. Such poster assignments afforded students the opportunity to fully engage with the design principles learned in the course and use elements of visual language, including images, shapes, symbols, colors, typography, and page layout. Additionally, these assignments allowed students to use both visual and verbal information equally, without unduly encouraging one mode over another. By the time students had designed their midterm posters, they had engaged with topics that included theories of visual communication (gestalt and semiotics), elements of visual communication (dot, line, shape, space, balance, etc.), color, typography, logo design, and principles of design (e.g., contrast, repetition, grouping, alignment, and balance). By the time they designed their final posters, students had engaged with additional information about color, image and photography, informational graphics, and the moving image. One of us (Lauer) blindly scored all the poster assignments;

thus, we did not know the participants’ spatial group assignment at the time of scoring, which eliminated any chance that unintentional scoring bias would be introduced by prior knowledge of spatial ability.

The midterm poster assignment promoted the new light rail system that had recently come to the metro area surrounding the university. Because the midterm poster was part of the normal course work (which would progress through multiple drafts, peer review, instructor feedback, etc.), we collected the initial design drafts for the study that had not yet received any teacher or peer-review input. In the last week of class, students were assigned and turned in their final poster after they had completed all their other course work (including a final project). This final design required students to produce a poster promoting a class on the history of landscape design, which was being offered in the fall. We again scored these final designs blindly, using the same rubric that we used for the midterm assignment (see the Appendix).

Results

To evaluate the differences in prior course work or experience between the high- and the low-spatial ability groups, we compared participants’ responses on the PDQ across both groups. Based on their PDQ responses, participants in these two spatial ability groups were not different in either (a) the number of prior classes they had taken in visual design or (b) their familiarity with such design programs as Adobe® Photoshop®, Microsoft® Publisher®, or Adobe® Illustrator® ($F_s < 1$). These results are summarized in Table 1. Thus, participants in both groups were well matched in their prior course work and relevant computer skills. This fact is critical because it suggests that any subsequent differences between groups were not due to other factors such as previous course work or software experience and that both groups were entering the class on more or less equal footing.

Table 1. Means (Standard Deviations) of Participants’ Responses to the PDQ

	No. of Previous Design Classes	Experience With Adobe® Photoshop®	Experience With MS Publisher®	Experience With Adobe® Illustrator®
Low spatial	2.75 (4.40)	2.50 (1.05)	1.50 (.55)	1.67 (.82)
High spatial	1.67 (2.66)	2.83 (.98)	1.83 (.98)	2.00 (1.27)

The scores for both the midterm and the final posters of both spatial ability groups is charted in Figure 2. As the chart shows, the performance of both groups of students increased with instruction, $F(1, 10) = 5.05$, $p < .05$, but students with high-spatial ability outperformed students with low-spatial ability on both assignments, $F(1, 10) = 14.13$, $p < .05$. There was no significant interaction between spatial group and assignment, which suggests that performance on both assignments remained consistent across the spatial groups.

Given the modest sample size used in this study, we completed additional select qualitative analyses to better explicate the differences between these two groups and to help illustrate more clearly the patterns of differences between the designs of high-spatial versus low-spatial thinkers. These qualitative analyses supplement and expand on the overall statistical differences that we observed and provide a more tacit consideration of the pattern of differences between these two spatial groups.

We analyze here five pairs of examples—four from the midterm designs and one from the final designs. We included more examples of the midterm designs because these designs were accompanied by a written explanation from each student (whereas the final was not). These explanations provide compelling evidence of students' reasoning, so we included excerpts from these explanations to supplement our overall analyses. In general, we found that the designs of high-spatial thinkers exhibit a number of traits that make these designs more successful overall:

- use of visual language, rather than verbal language, to make arguments and support a metaphorical theme
- use of specific details of visual elements to help set the overall mood and make more targeted appeals to audience
- development of a strong focal point through the use of a dominant image or image–text combination
- organization of page space in a hierarchy of information that aids in the readability and flow of information
- use of white space as a visual device to direct attention and set the overall mood
- integration of words and graphical elements in a unified message

In contrast, the designs of low-spatial thinkers exhibit more use of verbal content to put forth arguments and use visuals only to support or illustrate claims that have already been made in words. Their messages tended to be more generic, dispersed, and unfocused, without a strong focal point or

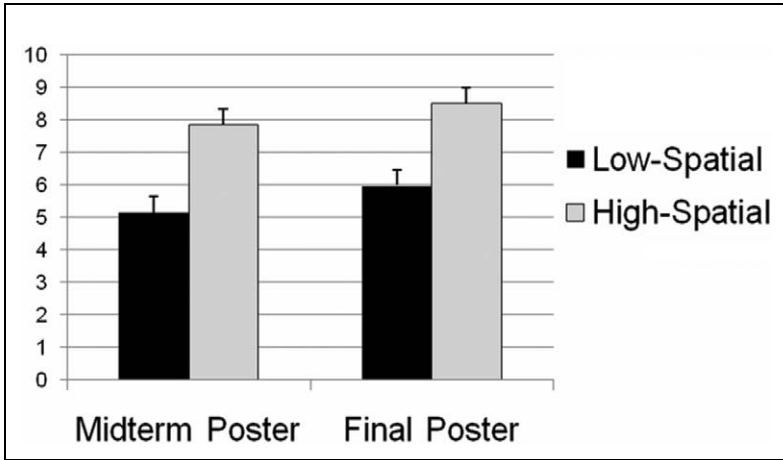


Figure 2. Midterm and final poster scores for each spatial group
Note: Error bars represent the standard error of the mean.

visual hierarchy. Further, they tended to put forth flatter compositions; that is, they did not use a figure–ground relationship that would craft a sense of depth. The following examples illustrate these findings more specifically.

Midterm Poster Example 1

As part of the assignment, all the students did a great deal of research to identify the values and traits of the audience to whom they would be directing their posters. But the posters in example 1 (see Figure 3) show that the high-spatial student was able to visually represent the appeal (speed and consistency) that the light rail might have for his identified audience of young professionals who take the light rail to work whereas the low-spatial student was unable to visually capture the light rail’s appeal to her audience.

Although in her analysis of her poster, the low-spatial student wrote at great length about the appeal (convenience, mobility, and safety) of the light rail to her audience of senior citizens, she does not portray these characteristics in her design; in fact, her font and image choices actually contradict some of the audience values she identified. Further, the appeals she made to her senior audience were made exclusively through words, not

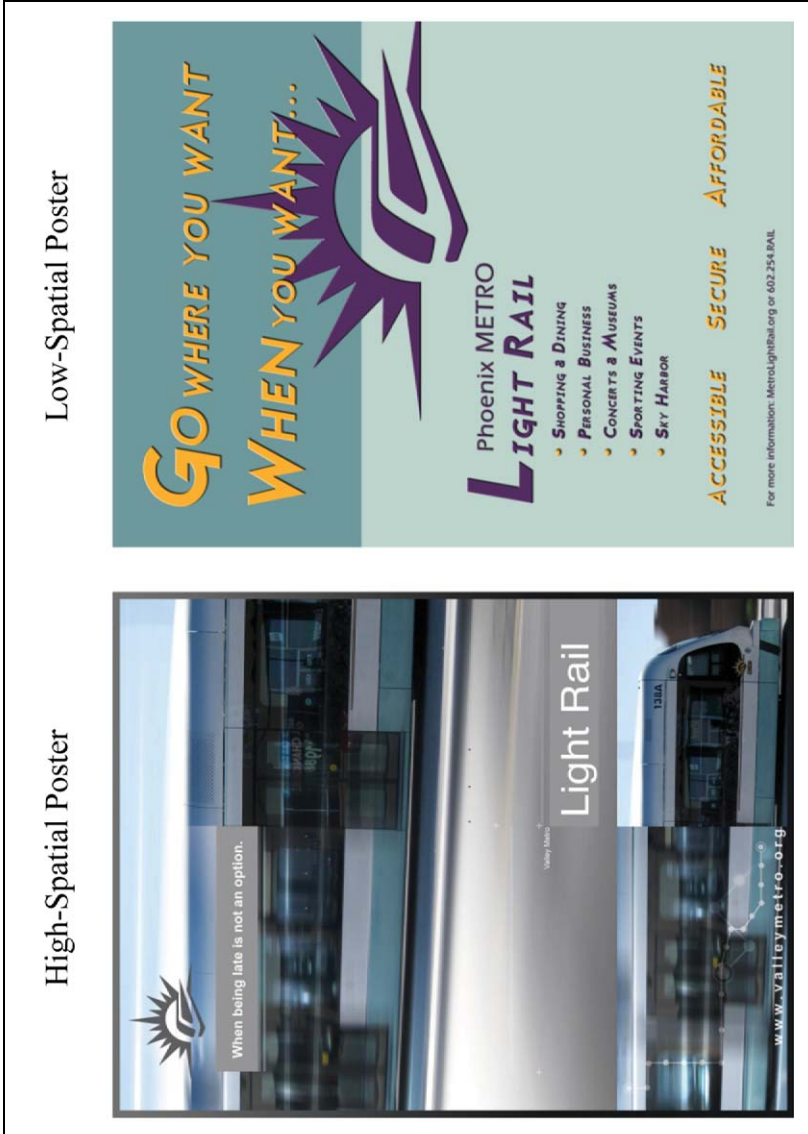


Figure 3. Midterm poster example 1

visuals. For example, rather than using any number of images that might have conveyed a similar message about the potential draws for senior ridership, she used the words *accessible*, *secure*, and *affordable* to communicate those attributes, in addition to a list of all the sights along the light rail that seniors might want to visit. Also, although she included one image element—a much-enlarged version of the existing light rail logo—her analysis of her use of that logo and her choice of typeface seem to contradict the values she identified for her chosen audience of senior citizens:

The Metro Light Rail logo is a vibrant, futuristic image, and makes a dynamic focal point. The triangular shapes resonate and imply motion. The typeface used for “Phoenix METRO” is Eras Medium regular. This has been used to replicate the look of the Metro logo. The remaining text is in Transmetals font, which is a modern, all caps script font that reflects a sleek, urban image.

Nowhere in her lengthy discussion of her senior audience at the beginning of her analysis did she describe this audience’s desire for anything “futuristic,” in “motion,” “sleek,” or “urban” in the light rail. Such attributes, while appropriate for some audiences (e.g., students and young professionals), are less likely to be valued by her senior audience. Thus, this student has unknowingly set up a contradiction between the visual and verbal elements on the page (image that is sleek and urban vs. text that says “secure” and “affordable”), and this contradiction contributes to the overall weakness of the design and reveals the difficulty this student had in making appeals visually.

The high-spatial student, on the other hand, had better success in appealing to his chosen audience of young professionals because he used visuals that captured what his audience wanted from the light rail—mainly, the assurance that it would get them to work faster than their cars would and that it is a sleek, trendy way to travel in an urban environment. This student explains how his visuals appeal to the needs and values of his audience:

The stereotypical businessman and woman are dressed to impress. They typically are well dressed, mostly in black and white, well groomed, and very clean cut looking overall. The importance to display those ideal[s] were crucial to the theme of the design. It needed to be sleek and functional, fast and modern, uniform and to the point. The overall design is of sleek, modern images of the light rail train. These images are cut up into three distinct parts to show you different scales and aspects of the train. The blurry images help bring emphasis to the notion that this train is going fast. Which in return helps support one of my major themes in the efficiency and speed of the train in getting to work.

In this description, the high-spatial student translates the values of his businessperson audience into specific visual traits that he uses to appeal to that audience more effectively. For instance, rather than simply stating that businesspeople seek to be professional, he translates that abstract notion into specific visual details that capture professionalism (e.g., “dressed . . . in black and white,” “clean cut,” “well groomed,” etc.). Similarly, rather than including random images of the light rail, this high-spatial student instead chose specific cuts (e.g., a side view of the train as it passes) and manipulations (e.g., parts of the train made blurry to represent speed) to visually capture the idea that people who take the train get to work quickly. In his poster he uses a minimal amount of text (“When being late is not an option”) to focus his message and support the argument that his visuals are already sending. In this way, the message is made stronger by the way in which the words and visuals work in tandem.

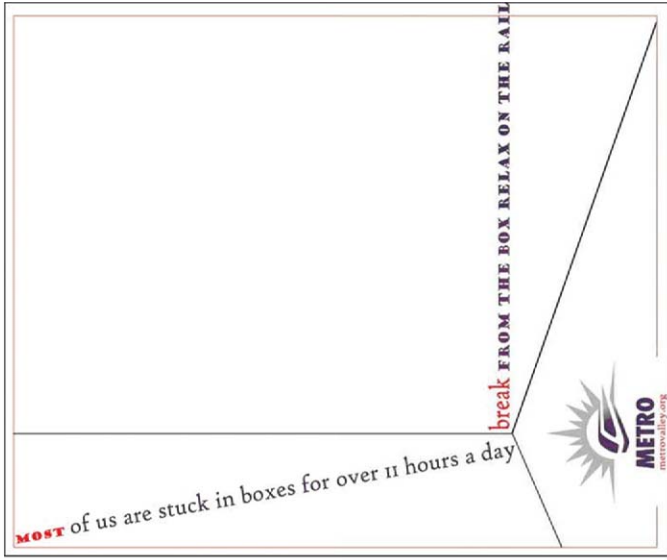
Midterm Poster Example 2

In example 2 (see Figure 4), both posters attempt to use visual analogy to suggest what the light rail can do for its audience (i.e., bring about a greener world, in one poster, and release you from your routine, in the other). But again, the low-spatial poster relies almost exclusively on words to make its analogy whereas the high-spatial poster uses a complex dominant image, the details of which successfully appeal to its intended audience of college students.

The message of the high-spatial poster is clear: Ride the light rail because it is better for the environment. This message is made clear not only by the text that suggests users “major in green” but also by the image of a young man riding on a train and looking out the window at a renewable energy scene. The student audience for this poster can be inferred from the youthful look of the rider, the book-bag strap we see around his shoulder, and the suggestion that the user “major” in something. The image works in conjunction with the text to send its “green” message. The high-spatial student explained her choice of image this way:

The main graphic of a young male college student looking through the window as he rides to school on a commuter train tells such an evocative story and is the focal point of the piece. His occupation as a college student is apparent from the strap of his bookbag lying diagonally across his chest. He is clean cut with a well trimmed goatee and has no obvious tattoos or piercings. His manner of dress is ubiquitous on college campuses around the world. His look is one of deep contemplation. He is neither cynical nor

Low-Spatial Poster



High-Spatial Poster



Figure 4. Midterm poster example 2

mirthful. He's obviously considering something of a serious nature like his future, but he's also riding the light rail so part of his commitment to his future is his commitment to "being green." He looks out the window on a meadow studded with wind generators that ties into the "green" theme seamlessly. He looks out at the "better world" he helped create.

This high-spatial student chose this photo, then, not only because of its more obvious symbolism made apparent by the man's young age and college-student status but also because of the subject's contemplative expression and serious outward gaze.

In contrast, the low-spatial poster uses no photo and little color to convey its message. In fact, the focal point of the poster appears to be the large blank area on the upper-right side of the page rather than any visual or textual element. The author attempted to construct the poster as a box that the audience can "break from" by riding the light rail. But the audience of workers to whom this poster is directed would probably have trouble discerning that message simply by looking at the poster, and they probably would not connect with any of the visual or textual elements in a way that would strengthen the poster's appeal to ride the light rail. In fact, because the box encompasses the entire page, it suggests that we are trapped within the box rather than able to break from it. The low-spatial student gave the following explanation of this analogy:

I think it is fair to say most workers look forward to four things throughout their day: first break, lunch break, second break and quitting time. Therefore, I used the word "break" to symbolize two "new" breaks throughout a worker's day. One during the morning commute and one during the evening commute.

Although the student attempted to position the text at a 90-degree angle to symbolize a break, he primarily relies on "the word 'break' to symbolize two 'new' breaks"—but the words he uses to symbolize this "break from the box" remain stuck within the box despite their textual assertion otherwise.

In addition, the light rail is not represented on the poster in any way other than the logo and the word *rail*. Neither the lines that form the box nor the fonts of the text suggest that this is a poster about a new train system. Whereas in the high-spatial poster, the image shows a student looking out of what appears to be a train window, which further strengthens the audience's ability to instantly recognize the poster's intent, in the low-spatial poster, no such visual cues are included to help the audience to recognize its intent.

Midterm Poster Example 3

Probably the most striking difference between the two posters in Example 3 (see Figure 5) is that the high-spatial poster looks neat and coherent while the low-spatial poster looks cluttered and scattered. The high-spatial poster displays a dominant image, a headline, a subhead, and a logo emphasized by the white space that surrounds it. As we saw in the previous examples, this high-spatial poster establishes a strong focal point and visual hierarchy through the use of a single dominant image to capture the essence of the light rail. Further, the angle of the featured photograph lends depth to the page, and the effective figure-ground play between the images and words increases the complexity of the message without cluttering the composition. The low-spatial poster, in contrast, combines a hodgepodge of different phrases paired with visual metonymies, resulting in an unfocused, cluttered, and flat effect.

The dominant image of the light rail train is not simply a generic representation; as the high-spatial student explains, it includes specific visual details that enhance the poster's appeal:

I took this photograph during the light rail opening festivities in [town name] in December 2008. At the time, there were thousands of people lined up and riding the trains all day; the excitement was at an intense peak. That feeling of excitement is why I chose this photo. We want to capture the level of energy that came with the opening day and propel that through to today. In this photo, the train is brand new and very clean and shiny, and that adds to the idea that this is new and forward thinking. Also, you can see the reflection of the crowd waiting to board the train in the side panels. I think that subconsciously if you are looking at that without knowing when this photo was taken, you might think you have underestimated the train's popularity. It can have the "every one is doing it" effect on the audience.

We can see from this explanation that there are a number of different subtle yet effective visual appeals being made through this single image, which allows the poster to make a complex argument without too much clutter.

In contrast, the low-spatial poster, which also attempts to make a number of appeals, has a design that is as chaotic as its message. The text and visuals, rather than complementary, are at times redundant and at other times conflicting. The images act as sidekicks to, or visual filler for, the text. As such, the words on the poster, rather than the visuals, dominate the message being made to the audience. In her analysis, the low-spatial student explains the poster's intended message:

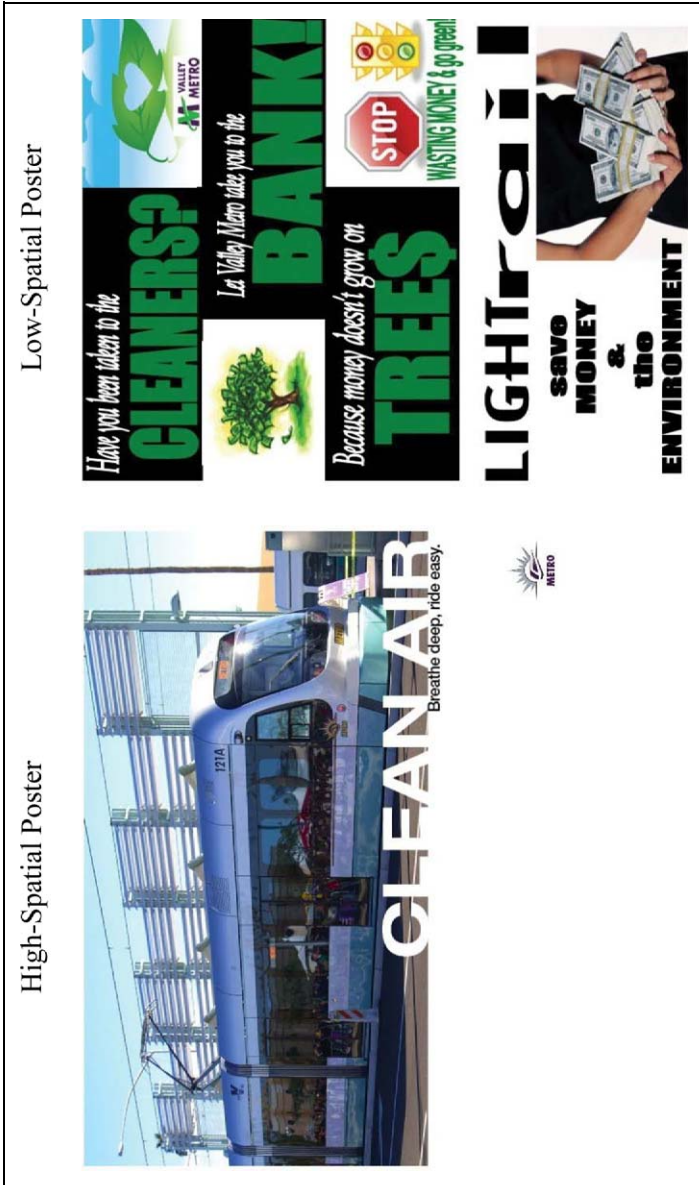


Figure 5. Midterm poster example 3

This question is, “Have you been taken to the cleaners?” Immediately after that question on the opposite side of the page is the statement, “Let Valley Metro take you to the bank!” *Next the “why” of these statements is illustrated [italics added] and that is because money does not grow on trees.*

This student claims to have “illustrated” the statements in the poster, but no such illustration has occurred. Instead, the “why” of her statements is articulated verbally (“because money doesn’t grow on trees”). Although she does include an image of a tree with leaves made of money, because she does not put a big red line through it, this visual representation of the verbal “because money doesn’t grow on trees” actually sends the opposite message (that money does grow on trees).

Rather than creating space for her arguments through layering, the low-spatial student includes a hodgepodge of messages and images and organizes them in linear fashion, starting with an image in the upper right-hand corner followed by one message after the other, forming a textual (rather than spatial) argument. She defends her design choice in this way:

I chose to place an image in the upper right hand corner of the advertisement of a leaf with a heart cut out in the middle which immediately expresses love for the environment and then I placed the Valley Metro logo directly beneath that image to show that Valley Metro is communicating a message tied into benefiting the environment to connect with those who have a love for nature and a passion for conservation.

An image of a money tree with one of the money leaves falling to the ground is also used to express this dual message of a financial and environmental nature. Next there is a stop sign which demands consumers to stop wasting their money and a traffic light with words beneath encouraging them to stop so they can “go green.”

This student is writing about her poster in a way that reflects the crowded nature of the poster itself. Interestingly, other assignments that she completed did not exhibit such poor writing, but because her poster contained such a multitude of messages, she had difficulty articulating clearly and convincingly why her use of visuals was effective.

Midterm Poster Example 4

In Example 4 (see Figure 6), both posters are intended to appeal to an environmentally conscious audience. Whereas the high-spatial student’s poster visually represents the advantages of the light rail and its ability to contribute to a “greener” world, the low-spatial student’s poster

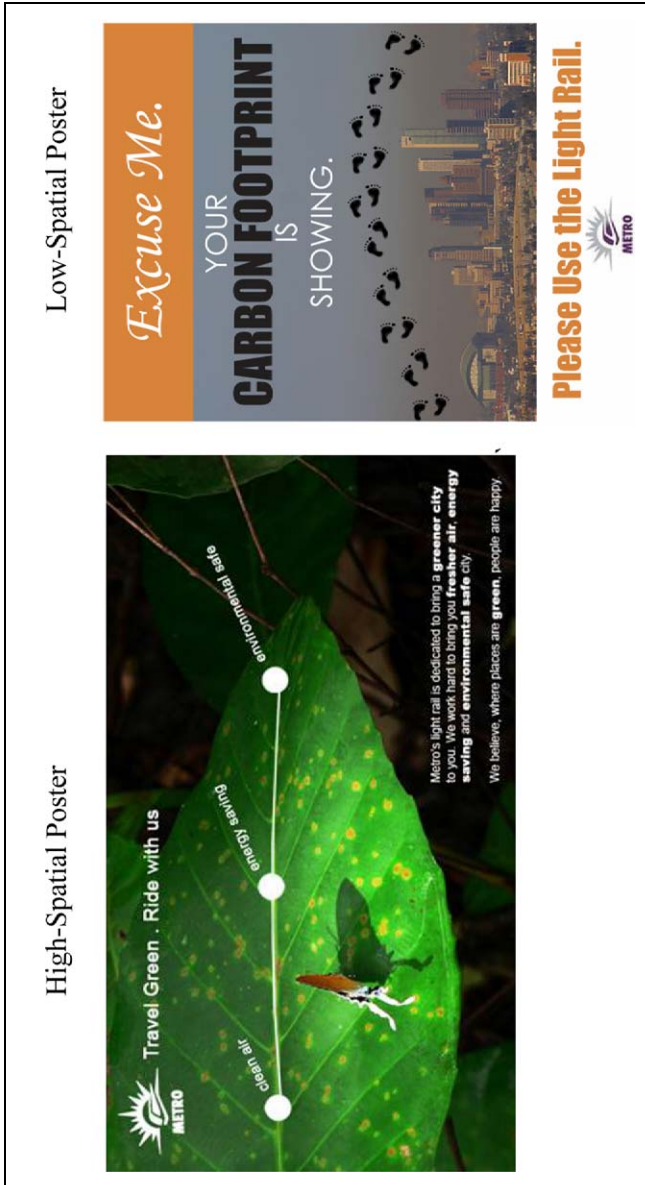


Figure 6. Midterm poster example 4

depicts the desired outcome through only a verbal plea (“Please use the light rail”) that is disconnected visually from the pollution scene in the poster.

The high-spatial student understands that in order for his poster to be effective, it needs to “provide the ‘green’ messages instantly to the viewers.” He explains that the green leaf and background hue establish the overall green look, the butterfly represents life, and the sunlight represents “a sense of clean and fresh air.” He also discusses the critical need to visually represent the light rail and does so through the route line depicted on the face of the leaf. This route line connects concepts of being green with the light rail by integrating verbal and visual poster elements:

I have created an imaginary light rail route on top of the leaf. This route has words that were repeated from the text on the bottom right, which displays the Metro commitment to the idea “green.”

He associates the light rail route with the leaf and butterfly (visual proximity) but also enhances this connection by repeating words like “fresher air” and “energy saving” in the descriptive section of the poster.

In contrast, the low-spatial student’s goal to “send a strong message to environmentally conscious individuals about the importance of utilizing the light rail” is not realized in the visual elements of the low-spatial poster. Rather than using visuals metaphorically to capture the “essence of theme” (Arnheim, 1969), the low-spatial student uses visuals to literally translate the verbal message of a “carbon footprint” through depictions of carbon-polluted air and a series of carbon-coated footprints. Rather than using images to represent the desired outcome (i.e., encouraging people to use the light rail because it will presumably reduce pollution and lead to a greener world), the low-spatial student relies entirely on a single verbal plea (“Please use the light rail”) and the Valley Metro logo.

The two students also use white space differently. The low-spatial student discusses her use of white space in a generic way that is unrelated to the overall persuasive goals of her poster: “Each of the words on this poster design is centered down the middle, freeing up plenty of space along the sides and making it appear simpler and less busy.” She does not explain how this use of white space makes the poster more persuasive, and she does not articulate the utility of this freed-up space along the sides or why a “simpler and less busy” message is effective here.

In contrast, the high-spatial student discusses how he explicitly uses white space to further the idea that riding the light rail is “classy:”

I would like show that light rail is a new and classy way of traveling, therefore it is important that the design provide a decent space that present a classy status. As a result, all elements in the visual ad has a good decent amount of space around them.¹

In this way, the high-spatial student uses white space not just as a method of increasing readability or clarifying his message but as a visual argument in and of itself. His use of ample, directed white space represents a common technique that can be used to send a more sophisticated message about a product or service (Berger, 2008).

Finally, these two students use color in their posters for different purposes. Although both students effectively use color contrast for readability, the high-spatial students uses color to reinforce the green message. He explains his deliberate use of the colors green and white in a way that shows the depth with which he has thought about the meanings associated with each color:

The color green portrays nature and environmentally safe message, with an addition of newness, youth and growth. Physiologically, it affects our nervous system, causing us to breathe slowly and deeply, which assist the heart to relax. These additional messages that the color green provides will only enhance the capacity of the light rail.

In contrast to the color green, the text are all in white, for white portrays the idea of pureness. This white enhances the information that the text provides, presenting the sincerity and honestly of Metro in providing what the text says. With this intention, the use of white is extended to the Metro logo.

This student uses the color green, then, not simply because it directly reflects the environment but also because it has a relaxing effect (Eiseman, 2006). He uses the color white not only because it contrasts with green (for readability) but also because it helps depict Valley Metro as an honest and trustworthy organization. And he depicts the Valley Metro logo in white to further strengthen this connection.

The low-spatial student seems somewhat aware of the attributes associated with the various colors she uses, and her explanation seems to make sense visually. But she largely misses the opportunity to appeal to the green (i.e., environmentally conscious) orientation of her audience:

With the majority of the design comprised of the very gray, dismal skyline, I felt it was important to add a very bright color to offset the “bad news” in a positive way. Orange seemed to be the logical choice. This color not only

conjures up images of vitality, fruitfulness, and energy, it's also offers a glimmer of glowing light at the end of the tunnel.

Although on the surface this explanation makes sense, it fails to explain how “vitality, fruitfulness, and energy” are related to cleaning up the smoggy skyline by riding the light rail. Her explanation for why she used orange might seem more reasonable if she were discussing an ad for an energy drink or sporting event rather than an ad for the light rail. Also, rather than offsetting it, the orange actually accentuates the gray, polluted air. Orange is a warm color that captures the heat of the smoggy scene rather than conjures a cool, clean scene that better depicts a world free of smog.

Final Poster Example

In the example of the two students' final posters, both posters at first glance convey complexity and sophistication through the inclusion of partially transparent background images that lend a sense of depth, set the aesthetic tone, and resemble landscape designs (see Figure 7). All of these elements graphically reflect the subject matter of the course for which these students are designing a poster. And yet, users viewing these designs would probably agree that the high-spatial poster is the stronger design. It uses design principles more effectively (e.g., alignment, proximity, contrast, and repetition) and manages space better. More subtly, however, it integrates verbal and graphical elements in a more cohesive, sophisticated way. In the high-spatial poster, the text is presented graphically. In the low-spatial poster, however, the text is placed haphazardly on the page (almost wherever there is room for it), and the reason for the undulating font style is not apparent. In the low-spatial poster, the title of the course is simply placed across the background image whereas in the high-spatial poster, the title of the course is integrated graphically into the background image, and the arrangement of letters and shape of the title captures the scheme of the background but remains large and contrastive enough to promote readability. The high-spatial poster manages white space better by grouping the course title in one area and the course information in another area farther down the page. A visual hierarchy is achieved using various font styles and type sizes within the title itself.

On the other hand, the textual elements of the low-spatial poster are all about the same size, failing to establish a strong visual hierarchy and making it difficult for viewers to decide how to direct their attention from one element to another. Although the high-spatial poster integrates text and

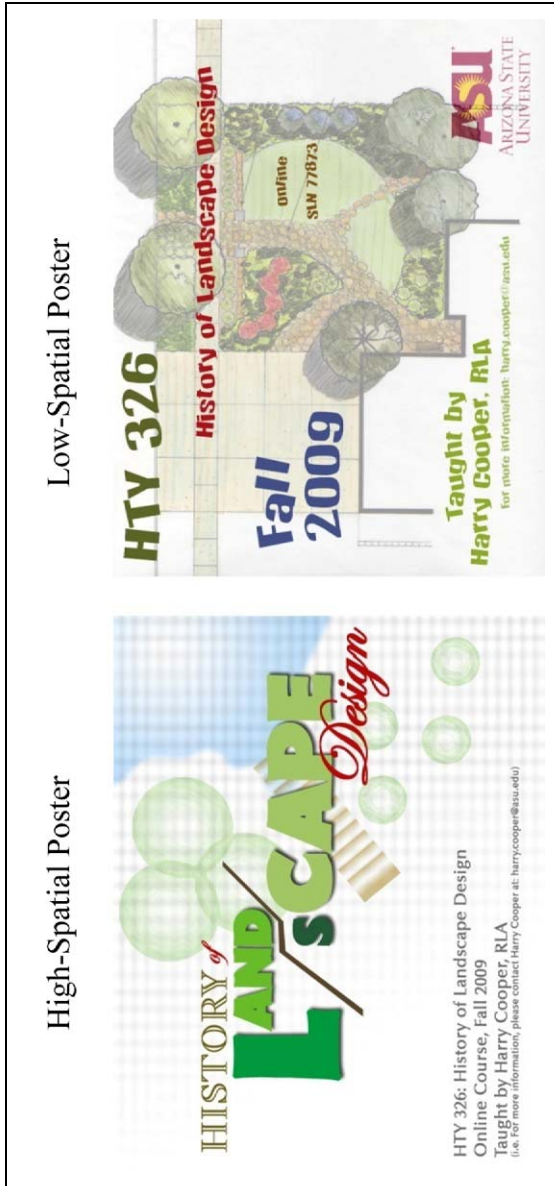


Figure 7. Final poster example

visuals to form a coherent focal point, the low-spatial poster features a background image with the text strewn about on top of it.

Discussion

This study has sought to confirm what many professional writing instructors have already experienced anecdotally: that some students seem to have more of a propensity for composing visual texts than do others and that students who lack this propensity may experience difficulties in making their designs better. While the results of this study represent a single investigation conducted in a small class, preliminary indications are that these difficulties that students experience may be, in part, a result of their low-visuospatial ability. Using examples of student work, we get an inkling of how we can recognize differences in students' visuospatial ability through the subtleties of visual design. Such recognition of visuospatial differences may represent the first step toward enabling instructors to address such differences and thus raise the overall design skills of all the students in the class.

Classroom Application

Our research has shown that instructors would benefit by considering differences in learner characteristics and developing strategies to address those differences in the classroom. For example, these strategies could include supplementing curriculum with readings and assignments that address more visuospatial components of design and help students use visuals and visual details to make arguments. Based on our qualitative analysis, these components should especially focus on helping students (a) translate verbal information into specific visual details that work persuasively, (b) recognize and use the multifaceted capacity of images (rather than assume that an image represents only a single and specific verbal message), (c) frame and arrange elements more deliberately within the space of a page, (d) integrate and layer words and visuals to develop depth and complexity, (e) establish a hierarchy, and (f) direct white space, not simply to make the design more aesthetically pleasing but to focus attention and support arguments.

Starting With Invention

At the early stages, students must be encouraged to think both verbally and visually about design problems (Brumberger, 2007a) and be given practice

translating between verbal and visual content. Given the public nature of professional communication documents, instructors and students often pay as much attention to the production and delivery of a document as they do to its design. As a result, the importance of early invention activities may be overlooked or overshadowed by research tasks. Research is usually conducted on the purpose of the document and the audience or user, and this research is almost entirely verbal in nature. For example, instructors might ask students to develop a “persona” or archetype that verbally articulates the goals or values of a particular user group (Summers & Summers, 2005). Although generating notes and lists of verbal descriptors is a common and useful practice, especially to hone in on the values and needs of a particular audience, it does little to address the dilemma of how to represent this information visually. Further, this dominant focus on verbal considerations may be problematic for low-spatial students because they may have difficulty finding ways to translate or capture verbal information visually, as our study has shown. Thus, instructors should devote a portion of the research time to exercises that encourage students to take their verbally expressed notions and ideas (e.g., the audience will only ride the light rail if they think it is safe; the audience wants a cleaner environment) and develop ways to capture these values visually.

For example, sample exercises could focus on brainstorming and interacting with different kinds of visual elements (e.g., symbols, colors, typefaces, shapes, lines, and effects) so that students can better appreciate the breadth of representation choices. This experience may help students realize that they are not limited to using a single literal image to represent a single generic concept when expressing arguments visually. Bang’s (2000) *Picture This* may provide an effective starting point for this discussion as she illustrated how a variety of visual elements can be used to convey emotions in visual messages. For example, she pointed out that

- “smooth, flat, horizontal shapes give us a sense of stability and calm” (p. 56)
- “vertical shapes are more exciting and more active” (p. 58)
- “diagonal shapes are dynamic because they imply motion or tension” (p. 62)
- “we feel more scared looking at pointed shapes; we feel more secure or comforted looking at rounded shapes or curves” (p. 98)
- “the larger the object is in a picture, the stronger it feels” (p. 100)

Discussing these kinds of design principles in class may encourage students to consider details about image elements in terms of specific aspects and

arrangements rather than just generic objects or haphazard arrangements of whole images on a page.

Other useful exercises could be adapted from graphic design textbooks such as Wilde and Wilde's (1991) *Visual Literacy*. For example, such exercises could ask students to

- depict a feeling, sound, emotion, or scene visually and then account for the details of their designs, comparing their representation to other representations in the class
- depict an object or theme a dozen different ways to explore the vast possibilities for representing an object or theme
- design a name tag or vanity license plate to represent the values of the primary audience for the design

These activities are decidedly nonprofessional writing activities and therefore may strike some as an impractical use of time, but they are not impractical if they help low-spatial thinkers to develop options other than words to communicate persuasively. These activities are important because they emphasize the creative and visual-thinking stage of invention that is necessary before a document can be produced and delivered. Students are often so consumed with concerns about what the final product should look like that they skip over the invention stages or otherwise devalue the importance of idea generation to the document-design process.

Aside from invention activities, supplemental readings and activities from graphic design textbooks can also be used throughout the design process to help students more effectively address other visuospatial design components. For instance, Ocepek's (2002) chapters on "Integration of Word and Image" and "Arrangement and Organization" and Lupton and Cole Phillips's (2008) chapters on "Hierarchy," "Framing," and "Figure-Ground" relationships provide explanations and examples that can be used as starting points from which students can practice applying these visuospatial principles to their designs. Activities that supplement and build on this additional reading are also critical because they allow students to put into practice the more visuospatial elements of a document's design. Potential activities might include asking students to analyze how framing, hierarchy, layering, depth, and integration of elements are realized in a wide range of documents, for example, by

- selecting an image or photograph to use in a persuasive document and practicing cropping the image in various ways to see how the

meaning or emphasis changes, paying special attention to the details of the image that are newly emphasized with each crop. Then students should practice placing the cropped versions of the image on the page in different sizes and with different margins and bleeds (i.e., when page elements touch the edge or exceed beyond the edge of a page). Students should compose two to three versions to share with the class, verbalizing their reasoning behind the choices they made.

- experimenting with designing several hierarchies for a particular document by playing with variations in the size, color, and positioning of both verbal and visual elements. Students also should experiment with a variety of margin widths and white-space arrangements in order to better craft a particular visual argument, emphasize particular visual and verbal elements, and direct an audience's attention through the page. The key is for students to compose several versions so that they can compare how the argument of the document changes as the hierarchy and white-space arrangements change.
- experimenting with various ways of integrating and layering textual and image elements on the page to support an argument, focusing specifically on details, such as a large piece of headline text and a major image element. Students can work with the details (e.g., lines, shapes, dots, directions, proportions, and colors) of the image, font style, or word arrangement and look for ways to incorporate those details throughout both the image and the textual elements, thus creating a more integrated whole. Students can also experiment with various opacities of elements that might facilitate a more complex integration of verbal and visual layers. These experiments will help students "maintain a tight relationship between words and pictures" (Ocepek, 2002), preventing the mixed messages and overall lack of cohesion that may result from texts and images that send divergent content or style messages.

Such activities can help students learn to use visual details to make and support their arguments rather than use more generic visuals to accompany arguments that are already being made in the written text (see Kress, 2009, for extended discussions of making arguments in different modes). While attending to more metaphorical and symbolic aspects of images and image elements may not be common in typical professional writing classrooms, our research suggests that low-spatial thinkers have difficulty using imagery metaphorically. Thus, a greater emphasis on how the particularities

of an image and its arrangement communicate metaphorically may be useful (see also Messaris, 1994, for a similar discussion concerning film students' shot composition).

Conclusion

Instructors need to continually reassess their fundamental assumptions about the relationship between verbal and visual information in a document. Rather than regarding verbal information as superior to visual information in its ability to communicate a message, instructors and students should treat them as equal elements that can be orchestrated and integrated to communicate effective messages to a 21st-century audience (Daley, 2003). Although professional communication is still a highly verbal endeavor in many areas of the field, professional communicators are paying increasing attention to visual elements in all documents, no matter what their subject or who their audience is as they move toward attending to the design of "the whole document" (Kimball & Hawkins, 2008). This increased attention to visual aspects of documents is in part a result of the affordances of various technologies that are now accessible to nonexperts (e.g., Adobe[®] Creative Suite[®]) and the proliferation of highly visual media available on the Internet and other outlets, including in the workplace. For example, even the most technical of reports attend to the visual presentation of information through elements such as page layout, cover design, image selection and details, font and color choices, and graph and chart design. Thus, instructors must increase their focus on visual communication and document design in an effort to help students develop a relevant skill set that will make them more productive professionals and more skilled document designers.

Because professional communication courses can be structured in a variety of ways and emphasize a wide range of topics, instructors need to determine what topics would have to be minimized or shifted to make room for an increased emphasis on visual thinking in line with the particular goals of each individual program. Ideally, courses focusing exclusively on visual communication and document design would be added to the curriculum as a required core course or at least as an elective course that students could take to supplement their other professional communication course work. Although incorporating this focus into existing classes is an option, this expansion may be hampered by the backgrounds and assumptions of current writing instructors. For example, professional writing instructors are more likely to come from

a writing background in which words have historically been privileged over visuals (Foss, 2005). Even if this verbal privileging is eased, many teachers simply do not have the training to instruct on visual design or the effective integration of visual and verbal content. Whereas high-spatial students may be able to develop these skills on their own, low-spatial students may need more directed instruction and feedback. Training to address this deficiency can occur in supplemental workshops (at conferences or on campuses) for current teachers and as a part of graduate course work or teacher-training sessions for graduate student teachers. Partnerships between professional writing instructors and design instructors on university campuses would also benefit both fields because future communication will continue to include more complex interactions between verbal and visual elements.

This article extends the suggestions of Brumberger (2007a) and others by providing discrete examples of design areas that are problematic for low-spatial thinkers. Although Brumberger offered excellent suggestions for how to incorporate visual work into existing documents and recommended approaches that instructors can take to promote students' visual flexibility, this article suggests how to recognize and develop approaches to the specific areas most in need of assistance.

Future research in this area should focus on replicating these effects with multiple classes and a larger sample size and might also evaluate these design differences across a wider range of document types (e.g., reports, brochures, Web sites). More detailed assessment of textbook content and teacher-training practices would also be beneficial, and a study that analyzes how professional communication textbooks approach integrating visual and verbal elements is already under way. Additional assessments that also capture this visuospatial ability and perhaps encompass additional cognitive abilities might also be warranted, again, to better appreciate the potential impact of these learner variables on communicating through design.

Appendix

The Rubric Used to Score the Poster Designs

The rubric used to evaluate student design work for this research study is based on the design principles students studied during the semester. Each design was given a score of 1 to 10 for each principle and those scores were then totaled. A holistic score was also given before the total was averaged to

measure against the average and ensure accuracy of the rubric. In every case, the holistic score was within a point of the average calculated from the other principles.

Focal Point

To what extent does the eye hone in on one spot that immediately captures and directs the viewer's attention? Or, are there so many things on the page that are so evenly positioned or sized that the eye darts around not sure where to focus?

Color Contrast (for readability)

To what extent is it possible to clearly see the page elements and clearly read the text?

Color Aesthetic (for style)

To what extent do the colors complement or contrast each other (both good) or do they conflict with other colors on the page in terms of tone, value, intensity, and hue? To what extent does the color reflect the subject matter and/or coincide with the values of the given audience?

Type Contrast (for emphasis and hierarchy)

To what extent are segments of text differentiated (through size, weight, structure, form, direction, and color) in an effort to emphasize important information and establish a hierarchy on the page?

Type Aesthetic

To what extent are the type styles used reflective of the purpose of a particular design and the values of the audience to whom the design is directed?

Proximity/Grouping

To what extent are related items grouped together to strengthen visual cohesion and improve the organization of content on the page?

Repetition

To what extent is there repetition of elements on the page (type, color, format, ruled line, image element, etc.) to achieve visual cohesion and consistency on the page?

Alignment

To what extent do the items on the page align or connect visually with other items on the page in a way that improves cohesion?

Blankspace/Spacing

To what extent is blankspace used to separate items, direct attention and contribute to the mood of the design?

Balance

To what extent are the items on the page balanced, either symmetrically or asymmetrically?

Integration/Cohesion of elements

To what extent do the various parts of the design look integrated and/or compatible with each other?

Inclusion/Emphasis of important info

To what extent did the student include the information a viewer would need to be persuaded or to make an informed decision and to what extent is the most important or relevant information highlighted or emphasized on the page?

Aesthetic dynamism/Creativity

To what extent does the design show intriguing and aesthetically dynamic combinations of image, color, font, texture, and organization?

Holistic score

To what extent is the design successful?

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Note

1. Quotes for all students are exact. This particular student is a second-language learner, so his prose is not always grammatically correct.

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