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Designing Research: Using Infographics to Teach Design Thinking in Composition

Annie S. Mendenhall[1]
Armstrong State University, Savannah, Georgia, USA

and

Sarah Summers[2]
Rose-Hulman Institute of Technology, Terre Haute, Indiana, USA

Abstract
As courses increasingly reflect the landscape of traditional print and emerging multimodal texts available to composers, instructors seek to teach students to synthesize the knowledges, skills, and awareness involved in the composing process. The ability to synthesize is especially challenging when composition assignments require sophisticated information literacy practices. This article argues that infographics, engaging and efficient visual representations of information, provide one way to teach students to see research and writing as creating and designing, not just mining and reporting sources. Providing both theoretical rationales and practical tools, the authors present two infographic assignments developed in different institutional contexts. Discussing assignment design, assessment practices, and reflective student responses, the authors describe how infographics can adapt to a range of research projects and curriculum designs, including stand-alone assignments or scaffolded research projects. These assignments help students develop metacognitive awareness of their composing and research processes that they transfer to other composing tasks.

Keywords
Infographics, Design, Multimodal Research, Multimodal Pedagogy, Assignment Design

[1] Annie S. Mendenhall is Assistant Professor of English at Armstrong State University in Savannah, GA where she teaches courses in rhetoric, writing, and composition theory. Email: annie.mendenhall@armstrong.edu

[2] Sarah Summers is Assistant Professor of English at Rose-Hulman Institute of Technology in Terre Haute, IN. Email: summers@rose-hulman.edu

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Introduction

The most recent revision to the Writing Program Administration's Outcomes Statement for First-Year Composition (2014) describes the array of composing knowledge students should learn by the end of the first-year composition course: rhetorical awareness, critical reading strategies, genre knowledge, information literacy, synthesis of sources, experience composing in print and electronic environments with multiple technologies, and understanding of tone, formality, design, medium, and structure, to name a few (pp. 144-148). Tallied up, the number of tasks seems daunting for a single course, a two-semester first-year sequence, or even advanced composition courses. Furthermore, the outcomes statement itself provides little direction for teaching the *synthesis* of all of these knowledges. How can instructors teach students to bring together the layers of knowledge, skill, and awareness required each time they approach a composing task?

Infographics, efficient visual representations of information that use visual relationships to make an argument, provide one way to accomplish this goal by engaging students in the process of research and writing as creating, not just reporting. Indeed, we argue that infographics can teach students what J. Purdy (2014) calls "design thinking," an invention strategy that asks writers to explore multiple composing possibilities and to see design as a critical strategy connecting multimodal and alphabetic essay assignments (p. 614). Infographic assignments offer students an opportunity to learn design thinking, because they compel students to engage questions about information literacy and the ethics and possibilities of composing for a public audience. For example, students must represent research efficiently without oversimplifying, adapt traditional citation practices, and incorporate Creative Commons licensed images. The process of transferring data from alphabetic to visual texts forces students not just to comprehend the information they read but also to apply the higher-order thinking that research assignments are designed to teach: to synthesize multiple sources, to interpret the relationships between those sources (both for themselves and for an audience), and to develop their own interpretation of the data.

Perhaps the greatest benefit to infographic assignments is that students are meeting these objectives while completing a project that they often deem to be relevant and useful. As A. Chong (2012) argues, data visualizations—of which infographics are one common example—are becoming "more integral parts of…our students' information diet" (p. 1). Even Facebook in its most recent design iterations, he explains, has focused on delivering information visually (Chong, 2012). In other words, students consume data visually throughout the day. An infographic assignment allows students to become producers, as well as consumers, of this increasingly common public research genre (Hill & Grinnell, 2014). Thus, the rise of infographics designed to condense and distribute research to the public, often through social media platforms, presents an opportunity for instructors to construct critical research assignments that complement students' experience of data presentation and distribution (Coad, 2013).

In this article, we offer insights from our experiences teaching infographics as a hybrid public and research genre by drawing on our assignments and assessment strategies, student work and reflections, and scholarship on multimodal composing and public writing. While our assignments had similar goals, they arose from different courses and institutional contexts, which we describe in depth in the sections that follow. By drawing attention to the common underlying

goals and the different classroom contexts, we provide a range of entry points for readers designing their own infographic assignments. Throughout our descriptions, we are transparent about our classroom objectives and our ways of teaching and understanding the writing process. For example, we use the term "compose" for the work our students did to align our perspectives with the revised WPA Outcomes Statement for First-Year Composition:

> In this Statement, *composing* refers broadly to complex writing processes that are increasingly reliant on the use of digital technologies. Writers also attend to elements of design, incorporating images and graphical elements into texts intended for screens as well as printed pages. Writers' composing activities have always been shaped by the technologies available to them, and digital technologies are changing writers' relationships to their texts and audiences in evolving ways. (p. 144)

This definition captures the range of work—designing, writing, integrating—instructors ask students to complete in first year composition and beyond. By contextualizing our projects as aligning with the WPA Outcomes Statement, we present ideas for revisiting and extending these outcomes beyond first-year writing, in a digital writing course and an advanced composition course.

In what follows, each of us describes her own infographic assignment as well as the resulting projects and student reactions. Each "Project Origins" section presents the institutional and curricular context for the assignment and a pedagogical rationale for teaching infographics. "Nuts and Bolts" presents each project's requirements, supporting materials and readings, and examples of assessment techniques. Finally, "Student Research and Reflection" describes the projects students created and includes their voices from written reflections on their work. Our conclusion synthesizes our findings about what infographics teach students—and composition instructors—about the composing process, and we articulate the potential for students to transfer the multimedia composing skills developed in these assignments to other composing tasks.

Sarah's Assignment Design: Using Infographics to Teach Research as an Iterative Process

Project Origins

I teach in the Department of Humanities and Social Sciences at Rose-Hulman Institute of Technology, a small, private, STEM-focused institution. Students' credits in my department are mostly comprised of elective courses, including my Writing in a Digital Age course—a course I designed in part to give students' practice using multimedia tools to convey their technical knowledge to a public audience. As S. Hill and C. Grinnell (2014) argue, "If we want our students to be successful in telling the stories of science and industry, we need to give them the tools available to them to do that" (p. 6). One of those tools, as we have already suggested, is the infographic. Infographics can be particularly useful for STEM students because they encourage students to show relationships, represent complex data clearly, and consider users' knowledge and experience (Chong, 2012; Hill & Grinnell, 2014). In other words, infographics give STEM students practice representing complex ideas to non-expert audiences in a visually appealing and accessible way.

Infographics also fit my course objective that students be able to conduct, assess, and interpret professional and scholarly research in an exclusively online environment. I began the research unit in Writing in a Digital Age with a question: What does it mean to do research in the

digital age? I already knew what answer to expect as my students responded all at once: "Google." In a 2012 Pew Research Center study of 2,000 middle and high school teachers, 94% reported that students are "very likely" to use Google in a research assignment. Only 25% reported that students are very likely to use news sites and 17% reported that students are very likely to use online databases. In the same study, the teachers (99%) agreed that the "internet enables students to access a wider range of sources" but 76% also strongly agreed that it has "conditioned students to expect to be able to find information quickly and easily" (Purcell, Rainie, Heaps, Buchanan, Friedrich, Jacklin, Chen & Zickuhr 2012, pp. 3-4).

I do not mind students arriving to my college courses with instincts to rely on Google—or maybe Google Scholar on a good day—for their research projects. I can design projects that pull them away from Google and toward other more scholarly resources. But increasingly, I've noticed students viewing these research assignments and their parameters, which often include finding a certain number of sources from a scholarly database, as busy work or a phony representation of research and writing meant to fulfill classroom, rather than real world, criteria. This response is linked to the idea that students expect to be able to find information quickly and easily. More importantly, they know that others—their potential audiences—can find information quickly and easily, too. So what is the exigence for doing the work of conducting, summarizing, and writing up research if someone else could just as easily Google and find the original sources? In the sections that follow, I describe an infographic research assignment that I designed to provide an exigence for student research and composition. This multimodal assignment gave students an opportunity to see their research as a public resource with a clear rhetorical purpose to educate, persuade, or inform. Infographics encourage students to distill, synthesize, and categorize information in a way that cannot be Googled, which allows them to compose something new and make what they perceive to be a real contribution to knowledge.

Nuts and Bolts

The multimodal assignment I designed tapped into an institution-wide project to answer how STEM has changed human life in the last 300 years. I instructed students to narrow their focus to a specific STEM innovation that interested them and develop a specific research question. By connecting their research question to an ongoing campus conversation, students were joining a discourse community of peers, faculty, and administrators who were already invested in the potential results of their research. I then asked students to use Piktochart, a free and fairly intuitive online infographics editor, to create an infographic that answered their research question and contributed to our campus answer to the larger question posed by the administration. As I explained in the assignment sheet, "This infographic is your opportunity to participate in that larger conversation. Show us something we don't already know—or show us something we know in a new way" (Summers, 2014, p. 1). Thus, students could retreat to Google to get ideas, and even data, for their projects, but from the beginning they had to think about shaping that data visually for a specific audience. That kind of thinking, design thinking, cannot be Googled, summarized, and reported.

In-class instruction and discussion focused on analyzing existing infographics and synthesizing students' knowledge of traditional research and writing with the alternatives provided by multimedia tools. We discussed how to find and evaluate online sources, read about the origins of Creative Commons and searched for CC-licensed images, and evaluated many sample infographics. I introduced students to ethical data-visualization practices, such as always

showing zero on a chart's numerical axis, but I avoided a long list of instructions for creating an infographic. As Chong (2012) argues, a focus just on technique or "rigid instruction" diminishes students' engagement with the design process. Instead, he advocates giving students "opportunities to discuss and, more importantly, debate critical elements of visual design and rhetoric" (p. 4). To create opportunities for discussion and debate, I assigned *The Best American Infographics 2014* as a required course text, which provided students with examples of the stylistic range of infographics as well as some design inspiration. (The variety of examples also helped us answer technical questions such as "How do people cite sources in an infographic?") During one in-class exercise, I divided the class into small groups and assigned each group an infographic from the text. After analyzing their infographic, they reported back to the class on how it conveys its argument and its strengths and weaknesses. This exercise built a common vocabulary for talking about and assessing infographics, as well as setting standards for what makes a good infographic.

I assessed students' projects using a rubric that grew out of our conversations about the infographics and N. Silver's (2014) introduction to the course text. In his introduction, he lists three ways that infographics have advantages over "purely verbal" arguments: approachability, transparency, and efficiency (p. xii). These three categories became categories on the assessment rubric—alongside Research, Content, and Mechanics—as well as a way that we assessed infographics we studied in class. While Silver's focus is contrasting infographics against textual arguments, these three categories also capture what I hope students can achieve with print-based composition: arguments that are accessible to their audience, make the sources of their claims transparent, and are clear and focused. Purdy (2014) explains that one potential use of the term "design" is to consider how to "apply what [students] learn from digital texts to print texts," citing examples from human-computer interaction and video game design (p. 618). Thus, the move to multimedia research does not have to be a one-way trajectory. By practicing an approach to research that focuses on composing a useful product for a real audience, students reconceptualize the task of research more broadly.

Student Research and Reflection

Students' projects ranged from a large silhouette of a body that displayed advancements in joint replacements and a group of batteries used as bar charts to show why the U.S. needs renewable energy to a Game of Life-style map that showed the unexpected places where physics research is put into practice. Students also took the opportunity to learn more about their disciplines; one infographic defined Systems Engineering and another looked at the history of pair programming. Beyond the disciplinary context and history they learned, the students' reflections on the project—posted on their course blogs—suggest two other learning outcomes related to research and design thinking.

First, students experienced research as an iterative process, rather than a means to a specific product. A potential pitfall of the reliance on Google is that students can quickly find sources that confirm their preconceived ideas or arguments; without prompting from instructors, they rarely have to go back to the drawing board and rethink their research questions. The right kinds of Web 2.0 tools, however, can, as Purdy (2010) argues, "promote the idea that research, like writing, is an evolving recursive process" (p. 55). Many of my students had precisely this experience while designing their infographics. They began with an idea of what they wanted their infographics to look like, but often they could not find data that would help them create the

visuals they imagined. For example, one student began his project looking at models of the same car over time, and he planned to visually represent the change in fuel efficiency related to innovations in engine design. He quickly realized, however, that the change in fuel efficiency was nearly imperceptible on a highly visual chart. He revised his research question—and subsequently his design idea—to focus instead on comparisons of SUV weight to fuel efficiency, a comparison that was easier to display visually. This student learned to see research, argument, and design as a recursive, rather than linear, process.

Other students reflected on similar experiences having to revise their research questions or find alternative sources. One student who researched the effects of innovations in lighting on safety wrote,

> Reflecting back on this infographic, I would say the most important thing I learned was how to do proper research and find data in a collection of poor data. I also learned that sometimes you can't find number data like you want and instead have to find different types of data and new ways to represent them that the users can understand.

This student worked to find the best data—not just the first data he came across. Silver's (2014) principle of transparency, which he describes as an infographic's ability to "let the reader see how the conclusions are drawn," asks students to be clear about their data, where it comes from, and how it is being represented (p. xii). Infographics allow students to practice that skill visually as well as verbally. These student comments suggest that adding the visual component forces them to think more critically about their sources and the representation; if readers are going to be able to *see* the data, those data need to be rich, reliable, and related to the research question.

Second, because of the public nature of infographics and the assignment's place within a larger campus conversation, students considered their audience, or users, throughout the composing process. As Purdy (2014) notes, two of the steps in design thinking are to "focus on the needs of users and offer specific suggestions for responses that will meet those users' needs" and to "generate as many ideas as possible that can meet a user's need(s)" (p. 627). To help students apply these steps, I invited a member of the Board of Trustees to our class to discuss his vision of the larger question posed to the campus community and to give students feedback on their ideas. After this interaction with a potential user, students often mentioned their users and considered how the users would best receive their information.

Based on students' reflections, it is the visual component of infographics that encouraged them to consider a user. In alphabetic essays, it is sometimes difficult for students to imagine how readers encounter text differently; however, they have more experience with the idea that people encounter and interpret graphics differently. Thus, they were conscious of their design choices and the potential readings and misreadings a user might have. For example, the student who researched joint replacements considered how the use of a human silhouette could help him divide information and guide a reader: "The silhouette serves as a divider between the header and the body of the infographic. In addition to the division, the silhouette guides the readers' eyes down the page as they move from head-to-toe, or in this case elbow-to-ankle." Another student wanted her users to have the experience of discovery while viewing her infographic, so she revised her original design to give the user a chance to see connections rather than to just read about them:

> I could have designed the infographic to explain the connection between each field and example. But how boring would it be to show a car and then list every type of person contributing to it? Rather, I let the intermixing of colored lines

> show the connections. I really tried to limit the words on the infographic to make the lines speak for themselves. I'm proud about how the visuals portray interconnectedness without the viewer having to read anything.

In this case, the student is capitalizing on Silver's principle of efficiency to allow the visuals to convey information on their own and engage the user in making connections.

A focus on users also encouraged students to revise their ideas about the purpose and possibilities of research as public writing. Because infographics allow students to gather information and create something new, students found the process more rewarding. Many remarked on the challenge of engaging audiences—especially regarding STEM topics—in a digital age. The challenge of engaging users gave students' research a purpose. As one student explained, "This assignment opened my eyes to the fact that in today's world, people need to be entertained. If they need to find specific information, they can use their smartphones and search it. What makes them dig deeper is an eye-drawing image and easy to read graphs and captions." After my experience teaching infographics, I would add that our students need to be entertained—or at least engaged—in order to do meaningful research. It is easy enough for them to Google something on their smartphones and cite it. To dig deeper, students need to employ multimedia tools to compose and design information in new ways for public audiences.

Annie's Assignment Design: Scaffolding Infographics to Teach Research as a Generic Design Decision

Project Origins

Infographics were the most popular choice students selected to fulfill a flexible multimodal research assignment given to my fall 2014 advanced composition course. At my institution, Armstrong State University, advanced composition is positioned ambiguously in the Professional Communications track of the English major as a 3000-level course on exposition, argument, grammar, and style. Those broad parameters needed to be supplemented with specific learning outcomes based on disciplinary knowledge about what it means to be an advanced composer. To that end, I designed the course to teach students to take ownership over the processes *and* the products of their writing by completing a multi-genre research project. Advanced composers should see writing as an act they can initiate and as a process of sustaining motivation in a project. Additionally, as Purdy (2010) suggests, advanced composers must learn to consider how to design texts in different genres, for different audiences, to enable the "generation of many, diverse solutions" (p. 626).

The course description on the syllabus called for students to "learn how to figure out new writing tasks when [they] encounter them and to see the commonalities and differences in rhetorical knowledge required to be persuasive in a variety of forms" (2014, p. 1). To focus this work, students selected a current policy issue, local concern, or organization to advocate, which required them to decide how to use writing to achieve their self-identified advocacy goals. This process helped students to engage in design thinking by "emphasiz[ing] the importance of considering many different responses to a design task, of not getting locked into one response too early to the exclusion of other options" (Purdy, 2014, p. 629). Students followed design thinking throughout the process, as they learned to *understand* (research), *observe* (analyze genres and understand how they work in the world), *define* (select genres appropriate to their advocacy

goals and audiences), *produce prototypes* or drafts, and *test* (receive feedback from peers and actual audiences) (Purdy, 2014, pp. 627-628).

Asking students to research their advocacy issue and compose in multiple generic forms teaches them to see research and textual form as interrelated design decisions, rather than static products or goals. B. Ray (2013) critiques genre-based assignments that view genres in isolation without asking students to reflect on how each genre takes up features from other genres they compose and how their own work is taken up by readers. Ray (2013) describes how "a single research paper or podcast can slowly evolve over the course of a semester into a complex organism as students take up their own work through various mediums and genres in addition to observing and reflecting on how their peers and members of the wider public sphere take up and respond to their projects" (p. 193). Multimodal assignments reduce students' ability to rely on prior knowledge of school genres (thesis statements, topic sentences, etc.); as a result, they highlight how generic features transfer (or fail to transfer) across different assignments when multimodal assignments are incorporated into a multi-genre project. This experience can be particularly valuable when students complete a multimodal assignment in conjunction with more familiar genre-based assignments like research papers and argumentative essays.

The assignment sequence for the course began with two familiar academic genres—a project proposal and an annotated bibliography. Students then chose three genres to compose within flexible categories outlined in the assignment prompts: a genre written for a public audience, a genre focused on research, and a multimodal genre. Throughout the selection process, students considered *why* they selected a particular genre and what it would help them accomplish for their advocacy project. As they composed each genre, I consulted with students, facilitated genre analysis, and designed activities for students to research different genres so the class could collectively generate multiple paths to completing each assignment.

Nuts and Bolts

The multi-genre research project presented infographics as one option to complete the multimodal assignment. I left the multimodal assignment open to choice following the advice of C.E. Ball, T.S. Bowen, and T.B. Fenn (2013), who argue flexible assignments mitigate instructors' desire to "[try] to make the students' texts perfect by assigning them a specific genre [the teacher] had set up in a formulaic way that they could fulfill" (p. 26). Although students selected an audience, genre, and purpose, the multimodal assignment required they adapt research gathered over the semester while composing two print alphabetic texts. This integration of research across genres resisted the tendency P. Kinnear (2013) critiques to teach multimodal assignments as "spice" rather than compositions that might be "examined for ways in which they may work with text, or against text, to mediate meaning making" (p. 187). When I introduced examples, many students latched onto infographics, finding them compelling to read, accessible to create using the available free web apps like Piktochart and Canva, and useful for conveying research in a new way.

The multimodal assignment prompt outlined the following four major grading criteria:

> **Persuasive Technique**: The genre uses the "available means of persuasion" most useful in the particular situation. The genre presents a timely, relevant, and compelling approach to the argument, and uses appeals to logos, ethos, and pathos effectively.

> **Visual Design**: The genre makes effective use of images, visuals, charts, graphs, white space, font, and other components of visual design. The best visual design relies on consistency (in formatting, text, usage, style, and tone) and simplicity (in visuals, colors, font styles, and quantity of text and visuals).
> **Stylistic Fluency**: The genre follows style and usage conventions appropriate for the genre and audience—or *breaks* those conventions in a rhetorically effective way. Research should be clearly cited in a manner appropriate to the affordances of the medium.
> **Use of Medium:** The selected media is appropriate, relevant, and useful for the project. (Mendenhall, 2014, p. 1)

This rubric emphasized that multimodal texts require rhetorical, design, stylistic, and media choices and are not straightforward visual representations of information. By mirroring the assessment criteria for the other genre categories students had already completed, the rubric reinforced the "valid connection between academic genres and their multimodal communication systems" (Kinnear, 2013, p. 185).

In class discussion and lessons leading up to the multimodal assignment, students learned the CRAP design principles (Contrast, Repetition, Alignment, and Proximity), popularized in R. Williams' (2015) *The Non-Designer's Design Book*, rather than focusing on technical skills. With this vocabulary for design, students described characteristics of effective infographics; in small groups, they found and analyzed examples online and then presented their recommendations about visual design, argument, research design, and citation practices to the class. Encountering numerous examples led to discussion about how similarities and differences in visual design hinged on the larger purpose for creating texts. After composing a draft, students completed a peer review activity for the multimodal genre, receiving feedback to revise their initial prototypes. Many also shared their prototypes on social media to receive additional feedback. This process taught students to research, find models, and draw conclusions about how to design, argue, and cite research effectively in this new format.

Student Research and Reflection

As students adapted their advocacy goals to infographic form, their decisions focused on how to convey research in a visually appealing design that would prompt social media users to share their work. As the word *share* suggests, students conceptualized infographics as an inherently social strategy for research and argument in a way that they did not easily do with the print alphabetic genres written earlier in the semester. Students also composed different types of infographics to suit their purposes. List infographics relied more heavily on alphabetic text, as was the case with Leah's[3] "8 Reasons to Remove Accelerated Reader from High Schools," which she designed to advocate for discontinuing a literacy program used in her high school, and Chase's argument about the misrepresentation of health information about coffee to the public. Comparison infographics presented an ethical choice to readers, such as Nicole's infographic on dolphin behaviors in captive versus in the wild. The majority of infographics submitted were numbers infographics, including Trent's infographic about the unfair treatment and sentencing of

[3] All student names have been changed to pseudonyms.

African American prisoners with mental illnesses, which grouped statistics from sources to persuade readers to act or think a particular way about the issue.

Student responses to composing infographics demonstrate the benefits of incorporating them as an assignment or assignment option in composition classrooms. First, students began to see how design decisions directly impact their argument. For example, Nicole created an infographic designed to advocate against keeping dolphins in captivity, and she revised her first submission for her final portfolio. In her portfolio statement, she explained that she revised her infographic "to make the argument more convincing." Nicole discussed how her revisions required thinking about the relationship between design and purpose:

> [I aligned the] graphics with the "So…now what do you do?" element that I added at the bottom to add more repetition. I amended the last comment about dolphins beaching themselves in order to better explain why it is harmful to dolphins and to add more incentive to the overall argument. Lastly, I changed the title from "Dolphins in Captivity" to "Unnatural Behaviors in Captive Dolphins" to better illustrate my advocacy against captivity.

Nicole learned that multimodal writing "requires a different style of writing and layout skills to place text in an easily readable format." At the end of the semester, she felt her work in the multimodal genre specifically helped her realize her strengths as a writer: "I think I do well with incorporating pieces of information and quotes into a project in order to support an argument. I use them appropriately and effectively. I also believe I have an eye for what looks aesthetically pleasing." Nicole's comment articulates how she integrated aesthetic knowledge, design knowledge, synthesis of research, and argumentation—four components of composing students have difficulty connecting in alphabetic texts.

Furthermore, infographics taught students how synthesis of research serves argument by requiring students to visualize connections among sources and to view research as a design activity. For example, Trent created an infographic linking statistics on racial discrimination, incarceration, and mental illness, where no single study he found sufficiently connected these three issues. In his reflection, he described the difficulties he faced trying to make an argument linking these trends. He noted, "In my opinion, the issue is not deemed to [] have enough importance for any real observation. I had to rely heavily on rhetorical strategies in order to connect with the audience." He saw the infographic as a process of "chos[ing] to classify and divide the evidence that I gathered. As he explained, "Empirical evidence was marginal, so I needed to group different statistics and ideas not normally linked to each other, and make them logical." Trent noted that he tried to accomplish this task in all of his papers. His purpose remained consistent even as the infographic allowed him to visually connect his research.

Like Trent, many students connected traditional composing tasks to multimodal composing tasks. Students found creating infographics to be more difficult and time consuming––more akin to essays—than expected. As Leah wrote in her final portfolio reflection, "This deceptive genre proved the most thought provoking and time consuming of them all. I did not realize the amount of non-textual aspects designers must consider when making a product like an infographic." Yet Leah found the "non-textual aspects" of an infographic allowed her to work on the same stylistic issues she focused on in her essays: concision. She noted, "My lack of brevity reared its ugly head when tight spaces made more text unreadable, incomprehensible, and out of place in this genre of mainstream communication." The infographic provided a new medium for stylistic revision and improvement, one that also highlighted how genre constraints shape style.

The infographic assignment demonstrated to students the importance of revision in the composing process. Specifically, students learned to adapt their purpose to technological constraints in revision. They pointed out that imagined designs could not always be enacted, just as constraints in genre, purpose, and audience require revisions in essays. As Nicole explained, "I originally aligned my main text to the right. I adjusted this to align everything to the left except for the title, which is centered. The only elements that lay outside the main left alignment are the graph and percentage. I had to do this because they wouldn't have fit on the page otherwise." Nicole valued alignment but made a rhetorical decision to sacrifice alignment somewhat in order to include particular graphics in her design, showing a sophisticated understanding of the compromises involved in all composing tasks.

Leah spent additional time revising because she wanted the infographic to fulfill its generic purpose: "I wanted to create an infographic that was more easily shared on Facebook than my original [draft], which became chopped up and altered" when it was exported to a PDF file. Leah contacted customer service for Canva, the web app she used, and worked with technical support to "mak[e] my product have a seamless transition from formation to publication." Her intent to share via social media compelled her to make additional revisions so she could "provide a better reading experience": "Prior to publishing my infographic on the Facebook pages of Scholastic and [Accelerated Reader's] developer, Renaissance Learning, I edited out some unnecessary wording in a section of the infographic already inundated with text. The minor change provided more whitespace and clarity for readers." Nicole and Leah's comments demonstrate that considering rhetoric and design *together* when creating infographics teaches the importance of the prototype and testing stages of design thinking Purdy (2014) outlines. Students questioned how readers would respond and what readers would do with their texts in more concrete ways than for the exclusively alphabetic genres they wrote. These sophisticated ideas about revision, purpose, and constraints then translated into students' revision of print alphabetic texts as they compiled their final portfolios.

As my experiences suggest, multimodal composing, and infographics in particular, allow students to reflect on "how shuttling between genres has (or has not) helped them to create a rich, sophisticated, and living ecosystem around an area that interests them that exceeds the potential of composing in any single or small number of genres" (Ray, 2013, p. 193). Furthermore, when scaffolded as part of an assignment sequence that teaches students to make design choices in selecting, composing, and revising genres, infographics and other multimodal research genres underscore the design thinking involved in the composition process in a way that reinforces the rhetorical awareness we want to teach students in all of our assignments.

Conclusion

As teacher-scholars trained in the history of composition (Annie) and writing center studies (Sarah), we may seem surprising candidates to experiment with multimodal composition pedagogies. But even though we have other specialties, our teaching experiences have motivated us to embrace multimodal work. In fact, we are precisely the kinds of teachers composition studies needs to engage to enact a broad, multimodal vision of composing across institutions. J. Palmeri (2012) points out that instructors have different levels of technical training and knowledge and therefore need "a flexible, adaptable assignment sequence that does not depend on the use of any particular technology" (p. 154). As our experience suggests, infographics flexibly adapt to a range of research projects and curriculum designs, including stand-alone

assignments or scaffolded research projects. With the availability of easy-to-use open-access infographic software, teachers can also design assignments with a low technological threshold and with no additional cost to institutions or students.

Multimodal assignments give students a purposeful context for making writing and design decisions, teaching them to draw from and use broader textual experiences to compose, and reinforcing the rhetorical, process, and generic knowledge that students need to learn in any composing activity. These assignments provide key curricular focal points to teach students to synthesize and employ their rhetorical, genre, research, and media knowledge in the composing process. Furthermore, students learn to understand and *describe* their writing process knowledge beyond simplistic notions about clarity and error. This metacognitive knowledge about the writing process is one important component of prior knowledge that students transfer to new writing tasks (Yancey, Robertson, & Taczac, 2014, p. 105).

Of course, this essay does not intend to present infographics as the one true way to teach multimodal research; multimodal pedagogies should avoid fetishizing a genre or technology in that way. However, the assignments presented here model ways for multimodal pedagogies to apply disciplinary goals in the context of specific institutions, courses, and learning outcomes. Composition instructors should engage in curricular change that sees multimodal composing as integral to writing classes. That change, as Palmeri (2012) argues, "can best be achieved through an evolutionary, flexible, and collaborative process in which instructors and program administrators work together to reinvent strategies for teaching multimodal composing within their own local contexts" (p. 153). Here, we have made our local contexts and curricular goals available to invite wider participation in multimodal pedagogies and to offer "a way in" to such pedagogies as ongoing change in communication technologies and genres continue to challenge teachers in the 21st century.

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