TRANSLATING SCIENCE WITH DESIGN'S PERSONAL VOICES: TOWARD A CRITICAL COLLABORATION

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Abstract

While advancements in environmental science can positively influence quality of life, affected communities may not easily understand the research itself. Graphic designers, however, routinely bring an empathetic voice to information and reshape it for specific audiences. Given the need to bring new research to groups with low levels of scientific literacy, how might design and science education connect to support critical environmental decisions?

We propose a socially responsible collaboration at both undergraduate and graduate levels, to create informative materials for these communities. Opportunities abound, yet these activities present challenges. A design student's personal voice is developing as they explore visual styles and individual approaches. Similarly, science students are unaccustomed to communicating their research outside their discipline. But with 'heart' and collaboration, the personal voices of design can translate science to help empower communities and promote informed decision-making.

Keywords

collaboration, design, literacy, personal voice, science, social impact, translation, visual rhetoric

Introduction

In graphic design, learning about and understanding clients, audiences and stakeholders is an essential part of creating works that 'speak' to a specific group of people. Scientific research, however, is typically disseminated within the academic community, and then conveyed to public audiences through sources such as news media and word-of-mouth. The original research is likely difficult for the average citizen to understand, and as this information moves further away from the source, there are risks of misconception and confusion. When a community is at the core of scientific findings related to environmental issues, however, it is critical for the research to reach the people and help inform decision-making. Unfortunately, many scientists face challenges in clarifying their research to those outside academia. We propose that designers and scientists work together to help make this happen. Collaborating can be advantageous to address low levels of scientific literacy in communities struggling to make informed decisions, leading to increased awareness, more inclusive conversations on policy and regulation, and ultimately social innovation for the greater good.

At first glance, graphic designers and environmental scientists may appear to have little in common. Our processes and approaches are quite different. Designers use an emergent creative process to arrive at a number of possible solutions for a specific situation. The scientific method, on the other hand, is data-driven and highly objective, with processes being repeatable to yield the same results. However, these are both creative problem-solving disciplines that imagine possibilities. Creating for positive change, scientific literacy and social impact is increasingly moving toward an interdisciplinary effort to address problems at local, national and global levels. Design and science are already being brought together in a few different ways. The STEM to STEAM initiative begun at the Rhode Island School of Design is being widely adopted by other institutions, with the belief that "the arts and design, in concert with fields like science and technology, will bring about the global innovation needed in the 21st century" (RISD 2013). A recent book, authored by two scientists and a graphic designer, serves as a guide to using visual design principles to communicate scientific findings (Frankel et al. 2013) while a data visualization exhibition was recently funded by the City College of New York to communicate climate change research to the general public (Polarseeds 2013).

How can these ideas be brought into graphic design and environmental science education? There are ample opportunities for young designers and scientists to play an active role in social change, and to carry these experiences into their future careers and research. Our collaboration began as a broad discussion on communicating science to uninformed publics, and this led to questions related to our specific areas of interest. In what ways could we collaboratively engage our design and science students in a local outreach project? Can scientific discovery be crafted into an expressive visual or interactive message, and still hold credibility? And finally, how can this enhance undergraduate and graduate education? Here, we offer our speculations on opportunities,

challenges and an educational initiative centered on collaboration between graphic design and environmental science students.

The Opportunity

According to a recent study on climate change communication (Leiserowitz et al. 2010), many Americans lack some of the basic environmental knowledge needed for informed decision-making: 57% know that the greenhouse effect refers to gases in the atmosphere that trap heat; 50% understand that global warming is caused mostly by human activities; 45% understand that carbon dioxide traps heat from the Earth's surface; 25% have heard of coral bleaching or ocean acidification. These knowledge base gaps may be due in part to a failure to effectively communicate scientific facts, and the inherent challenges faced by scientists in explaining complex and nuanced ideas to a more general audience. Additionally, a challenge inherent in these topics is the incremental change in environmental effects over time, and thus a need for long-term planning. An example of this is the Huff Run Watershed Area in northeast Ohio, a small community with a legacy of coal mining. Through the years, the watershed area has become contaminated (see figure 1). The area's restoration group has observed that communities that benefit most from government assistance in cleanup projects tend to be the most informed.

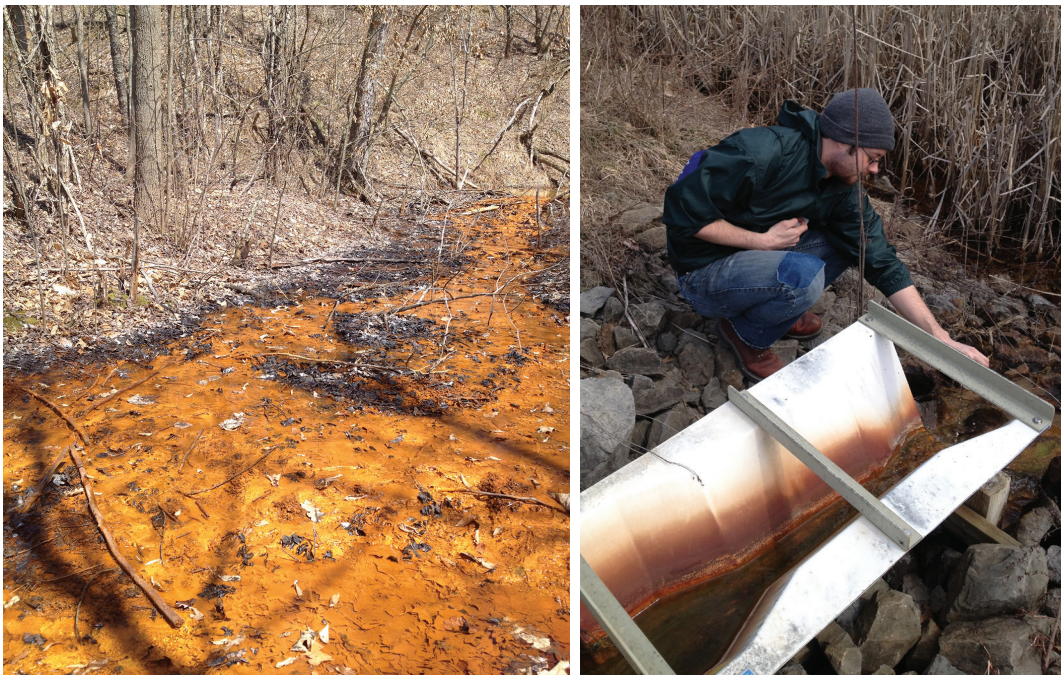


Figure 1 The Huff Run Watershed Area suffers from environmental issues.

Unfortunately, the lack of clear communication about an impacted site is often the limiting step in organizing communities to advocate for remediation projects. As in many parts of the country where environmental problems are faced, the quality of life needs to be improved. Ongoing discussions surrounding energy and material resources are subject to media misinformation and the inaccurate belief that scientists disagree on research. Political and economic agendas may also direct many messages, thus further skewing public perspectives. Additionally, scientific terminology and research reports may have little effect, other than confusion, among populations with low levels of scientific literacy. In short, an informed community is better equipped to get things done.

Informing a community about its environmental issues requires a shift in how research is communicated. What if we could effectively reshape and recontextualize this information for the average citizen? If environmental scientists can effectively explain their research to graphic designers, it may then be crafted into visual, interactive item. Collaboration such as this calls for clarity, expression and 'heart' to create empowering messages directed at specific communities. Working together to better understand the research, students can apply their skills toward developing artifacts, services or experiences for a community such as the one in the Huff Run Watershed Area.

Translating Science

While opportunities are numerous, there are also challenges associated with this collaboration: the communication and understanding of scientific research throughout the process, applying 'personal voice' to designed works, and the perceived credibility of those artifacts. Addressing and reflecting on these challenges can help to prepare design and science students in their future endeavors.

Figures 2 and 3 Graphic design students engaged in research and critique (left) and environmental science students collecting data (right).

The design student may have taken coursework in the sciences, and vice versa, but most likely not to the extent that they can easily understand the specifics and nuances of the other discipline. Though our classes are delivered in English, we speak different languages. We have our own jargon, theories and approaches (see figures 2 and 3). In this collaboration, there are data and processes that will need to be transformed to type and image, with attention to space, time and the target audience. The science students need to be able to communicate their research to a design student; the design student needs to understand the research enough to relay it to a community.

This might be approached as a type of translation. If science is considered a source text, the design student could take on the role of translator, which "involves a particular act of making, of creativity or invention" which also takes the needs of a message receiver into consideration (Venuti 2013: 35). At least two acts of translation are needed for this to work: from science student to design student, then from this combined design-science team to the community (see figure 4). The first is a challenge to science students as they eliminate jargon, clearly outline scientific processes and use visual media (sketches, diagrams, photos) to explain critical information to the design students. Secondly, the design students must work with this data, consider the community, and — with input from science students — transform it into visual or interactive prototypes. It is important for the scientific 'source text' to remain intact, but it will inevitably be reshaped and recontextualized through this translation process. The end result may be a poster, an exhibit, a mobile app or something else.

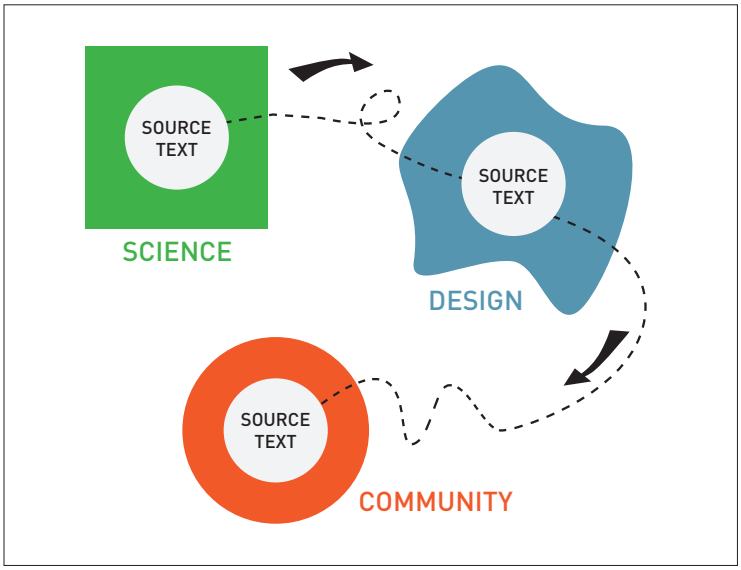


Figure 4 Theoretical translation process using scientific information as a source text.

There is an argument that bringing a maker's voice into the work is what separates design from art, and indeed there may a fine line separating the two. On one hand, personal voice might be understood as visual style and aesthetic. On the other, voice could be considered the student's

beliefs, convictions and attitudes – quite literally, their character. It is the 'heart' they put into their work, reflecting their values as well as those of others. Throughout a design student's education, they are learning to balance their voice with a multitude of other things: principles, technologies and processes – and needs of a user. In graphic design, expression could be described as the visual and interactive manifestation of emotion. It may also be the designer's personal voice as a reflection of the values, attitudes and beliefs of a community. It is in connecting with people's imaginations and beliefs that the designer's personal voice is most evident, and a community inevitably becomes the recipient of "the spirit the designer puts unconsciously into the body of his work" (Goudy 1940: 163), in addition to the formal content of the work. The emerging of emotional response of an audience may be the result of an empathic dialogue in this shared space (see figure 5).

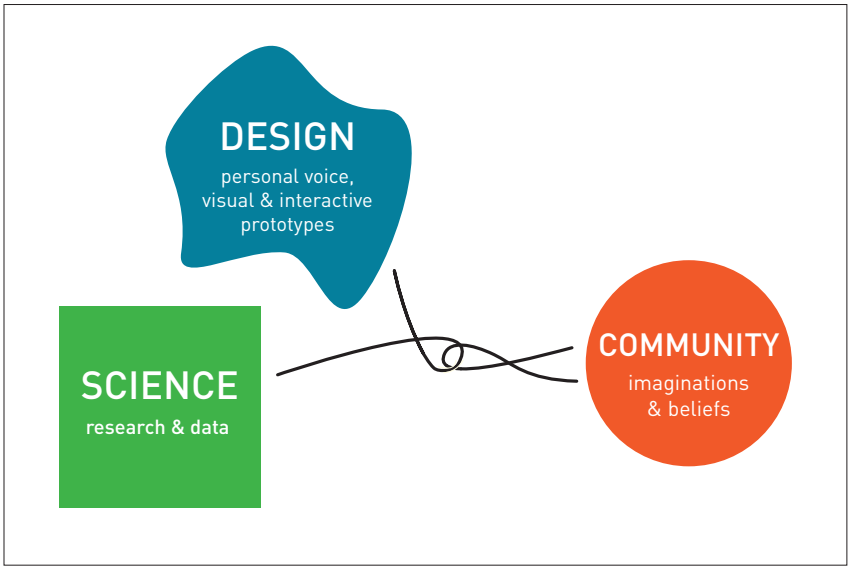


Figure 5 Design and science sharing an empathic dialogue with the community

It would seem counterintuitive to use expressive personal voice to convey scientific data. However, translating critical information for a community with low scientific literacy needs to move beyond a nice layout, line graph or digital data visualization. Students will be challenged to discover what will invite a community to read, see, learn and make a decision. Design is often perceived by the public, as well as other academic disciplines, as means to 'make things look good' and left as a final phase in a project. We can encourage making 'about' something, but may do more good to educate toward designing 'something' itself. It's a shift in thinking from "Hi, your water is contaminated. Go to this website to have someone do something about it" to "Hello [specific community]. Your water is contaminated. But we're going to explain to you how and why it happened, and help you make an informed decision on what to do next." This goes beyond simply clarifying information. Visually

relaying the message provides an alternative to text and diagrams originally intended for other scientists. This small change in thinking can change the way students approach and research future projects, and can also empower a community.

Encouraging personal voice in this, however, runs the risk of unintentional misrepresentation; at the same time, however, it is the students' voices that have the power to speak to communities in need. An emotional appeal can be extremely persuasive, but must be treated with care. This carries responsibility and an ethical approach to designing artifacts for communities in need of critical information. Designed solutions are never neutral and content is added when shaping a message. This content is steeped with image, typographic selection, interactive elements – and essentially, expression. To maintain scientific credibility, we will need to teach toward balancing the two: if critical scientific information typically looks like academic, black-type-on-white-paper research, how might a friendly, attractively designed product be received? Does the research document feel more 'scientific', and thus believable? What will most positively influence a community to become more informed? There are no easy answers to these questions, but by including this type of visual rhetoric into the classroom we can encourage students to consider how communicative forces work and facilitate positive change.

Educational Initiatives

To further these ideas, we propose a design-science educational initiative that is inherently collaborative: joint undergraduate projects and team-teaching graduate level research leading to regional outreach projects. This initiative aims to prepare students for collaborative, interdisciplinary work and positively impact a local community at the same time.

For undergraduates, we have outlined a collaborative 7-week project between a graphic design course and an environmental science course (see figure 6). The faculty would forge a relationship with a member of the affected community or remediation team, and frame the local environmental issue. The project brief describes the opportunity and scientific research references, as well as details on the target community and vehicle to be used for communication (i.e., poster, web site, video, etcetera). Throughout the project, the design and science teams handle separate tasks, but also come together to exchange information and receive feedback from the community representative. The science team is responsible for initially translating information to the design team, and ensuring the accuracy and integrity of the 'source text' throughout the process; the design team is tasked with reshaping the information, and creating prototypes for testing and presenting to the community representative.

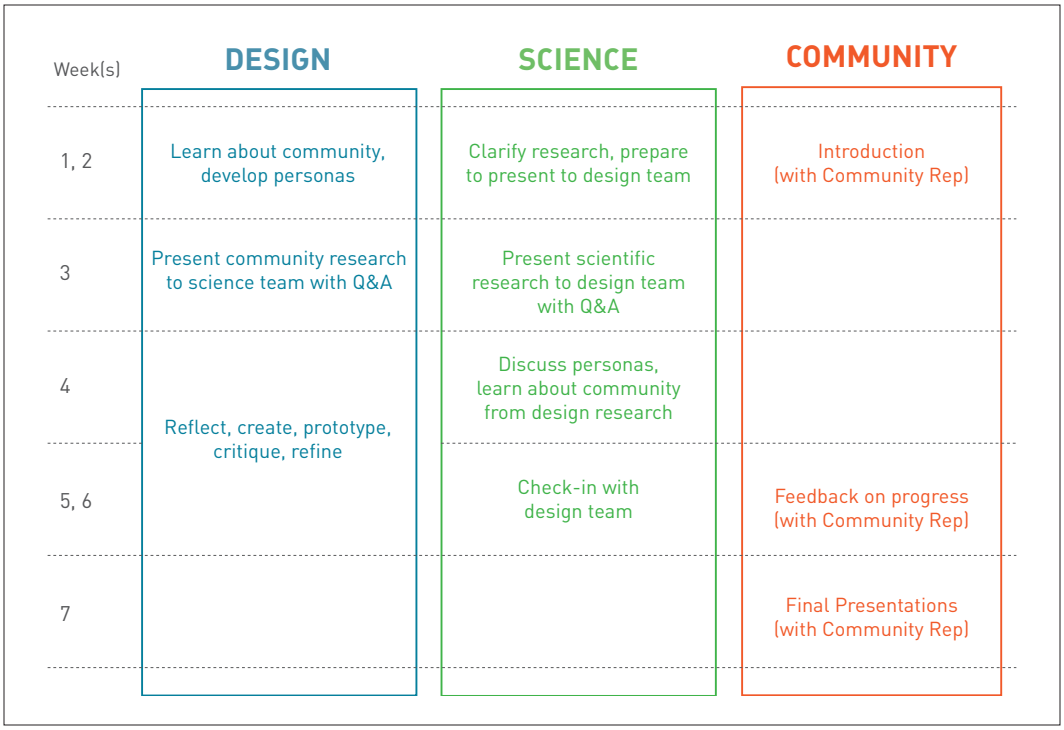
Through this project, students learn to collaborate with peers in an unrelated discipline through a guided process. Design students are challenged to work with new scientific research, and create

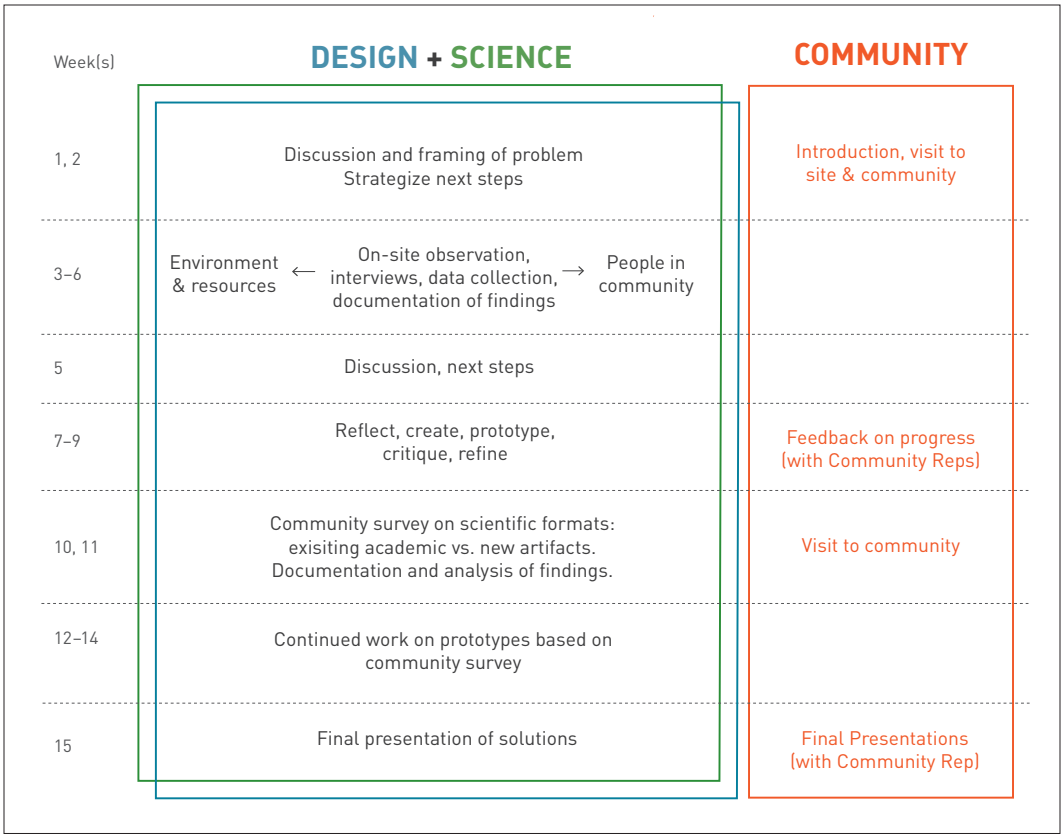
works that balance expressive visual elements with explicit data. Science students are challenged to communicate research to a non-science audience, better understand the community directly affected by their research, and gain exposure to design principles used in visual communication. All students will gain an understanding of how to balance research and design toward positively impact a target community. The community may use final designs to raise awareness of scientific research, as part of ongoing policy and regulation discussions.

At the graduate level, we see opportunity for a team-taught, special topics course aimed at graphic design and environmental science students, but also open to students in related disciplines (journalism, user experience, writing studies, etcetera). The environmental issue and target community are introduced, with students responsible for framing the problem, determining the media best suited for the community's needs, and using research alongside the creative process to inform solutions (see figure 7). Working on teams, primary and secondary research play key roles in the form of interviews, observation and hands-on prototyping. As part of this graduate level course, we also anticipate examining how the visual and interactive translation of scientific information affects the community's perceptions of credibility. Students will gather feedback on the community's background knowledge on topics related to energy and the environment. Those citizens will then be asked to provide user feedback on two sets of materials: existing scientific information presented in formats common among academic researchers, and new artifacts prepared from the interdisciplinary collaboration.

Students will experience collaborating on interdisciplinary teams to frame an issue related to both social impact and environmental issues, and conduct primary and secondary research to design artifacts to empower and inform. Design students gain experience 'translating' unfamiliar research, while devising appropriate prototyping and creative processes. These will address the ways in which complexity, clarity and aesthetic play critical roles in socially responsible design practice. Science students have an opportunity to transmit complex ideas to a wider audience and explain specific tools or techniques used in scientific research. Additionally, they will highlight the ways publicly funded research can result in positive contributions to a community. The community gains material directly from the source, to inform citizens on scientific research being conducted in their area and facilitate decisions on next steps.

In addition to enhancing each discipline, there are cross benefits. Design students gain exposure to cutting-edge scientific discovery, its effects on a specific community and how to adapt when working with critical data. Science students better understand design principles, how visual language 'speaks' to a community, and experience the creative process.





Figures 6 and 7 Undergraduate collaborative project framework (top) and interdisciplinary graduate student course framework (bottom).

Conclusion

While opportunities and challenges are present, this collaboration has the potential to positively impact communities at the local, national or even global levels. In addition to these educational frameworks and goals, all students will ultimately gain experience 'translating' language and communicating critical information with 'heart'. Beyond the discipline-specific advantages is the overall social contribution that can be made. An empowered, informed community leads to better decision-making and an increased quality of life.

This collaboration also provides students with an advantage as they begin their careers in academia or professional practice. When young designers are exposed to unfamiliar content or environments, they can draw upon these activities of translating and understanding. Similarly, young scientists will be able to better verbally communicate their research outside their discipline, and perhaps bring some design principles into their visual aids.

As we move forward, however, more questions arise. In design education, when does the reshaping of scientific information for a community cross a line into social activism? Will communities welcome our educational activities into their environmental discussions? And, how can this initiative become a sustainable model? While our next steps are to pilot these ideas in our classrooms, they are not limited to our institution. The educational frameworks and goals we propose are portable and may be adapted to other programs and communities.

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