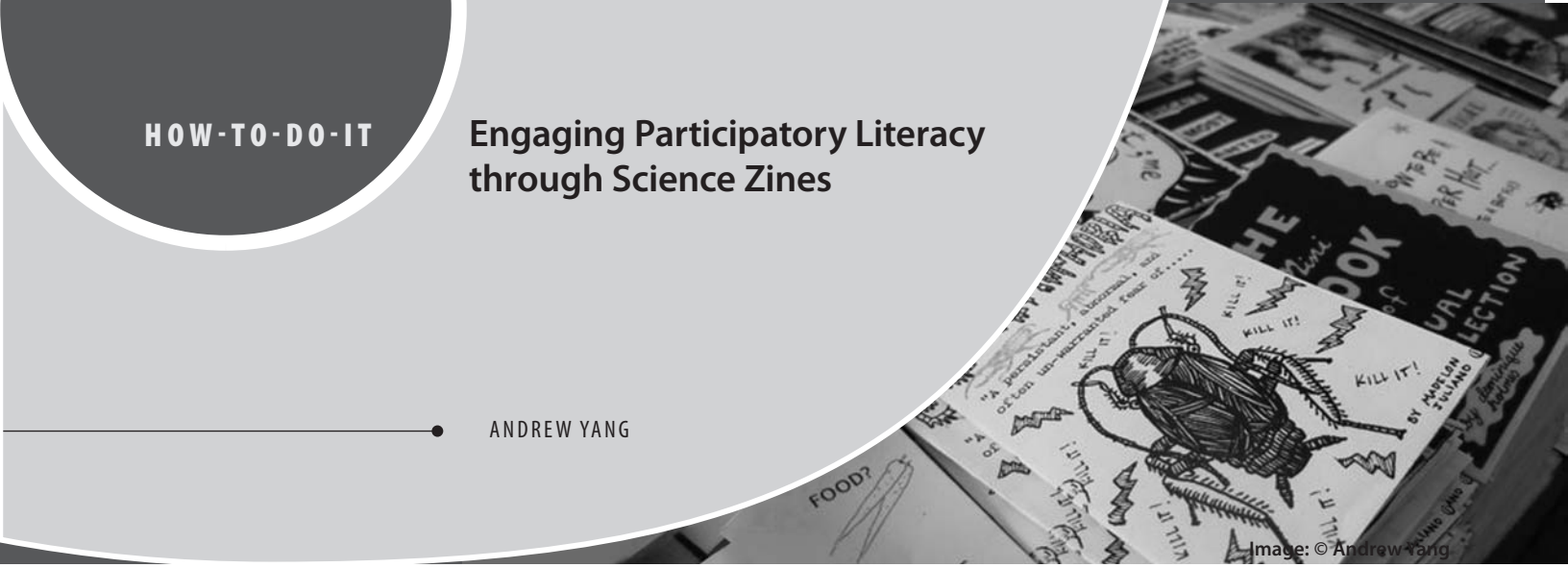
HOW-TO-DO-IT

Engaging Participatory Literacy through Science Zines

ANDREW YANG



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Abstract

Fostering science literacy by engaging students as active participants and communicators of scientific ideas can enhance learning as well as a sense of personal investment. Science "zine" projects can be an effective way to structure this kind of participatory science literacy and flexibly build on specific course content as well as skills in the research, conceptualization, and communication of scientific ideas. When students are engaged as media producers and educators, their role and responsibility in the "ecology of scientific information" becomes more apparent and potentially more rewarding.

Key Words: *Zines; scientific literacy; graphic narrative; active learning.*

Rationale & Objectives

It isn't an exaggeration to say that most of the crucial and contentious scientific issues of today, ranging from new biotechnologies to global sustainability, are intimately biological in nature. We find ourselves swimming in a myriad of media that offer to educate us on such topics – textbooks, magazines, nutrition labels, Web sites, and word-of-mouth provide plentiful information. Given the variety and varying quality of the information in circulation, the need to foster scientific literacy and critical discernment in students has never been more apparent.

However, if scientific literacy focuses solely on the role of students as critical media *consumers*, there is a risk that they will fall prey to the fairly common form of skepticism that considers no information fundamentally reliable. A consumption focus can paradoxically exacerbate a sense of being overwhelmed by just how much (often conflicting) information there is to navigate, which can make ignorance seem like a blissful alternative.

If, however, students move beyond being simply consumers of scientific knowledge and recognize the possibilities and responsibilities of being producers as well, they can become more engaged in the wider ecology of information that they are inevitably a part of. Designing curricula that actively nurture students in this way can be thought of as a form of "participatory literacy" (Jurmo, 1993) that enables not only greater engagement but also better learning outcomes. These ideas are well recognized in general art and humanities education (Jenkins, 2006), but science pedagogy has yet to explore them fully, especially considering the growing relevance of media in the public understanding as well as the practice of science.

The use of science "zine" projects is one way to engage participatory science literacy and foster a greater sense of participatory culture. Zines are much like any other small pamphlet or booklet, the important difference being that they are independent, noncommercial, and self-made, which allows them to be easily and inexpensively reproduced and distributed. Zines can combine personal and academic engagement with public outreach, activating students' curiosity toward research, reflection, and articulation of a topic to serve a wider audience.

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Indeed, zines can build upon specific course content while also helping students develop core skills of critically evaluating the quality of the information from various sources, reflecting on the intellectual and social significance of a topic, and thinking carefully about how concepts can be communicated to others in a way that is compelling and understandable, but also scientifically sound. As any science educator knows, this is no easy task, but zines provide just such an opportunity for students to be educators in their own right. Having to consider how to share scientific knowledge with others through the platform of booklet zines can deepen students' knowledge of a topic while giving them a greater sense of personal agency in engaging with science as nonspecialists.

In a world where scientific knowledge is increasingly complex and technical, the participatory literacy of zines can foster a sense of ownership that is often lacking for those who don't have the chance to study science formally or at an advanced level, or who had a bad experience with science learning in their educational past. By giving students a chance to be media producers and educators, a zine project can make their role and responsibility in the ecology of scientific information more apparent and potentially more rewarding. As a form of active learning,

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it also extends what they learn beyond the confines of the lab report, research paper, or test and into the broader community. Once the zines are finished, the students can photocopy them from their one-sheet format into simple, handy, and inexpensive booklets that can be shared easily. Ideally, such zines are artistic as well as educational. Students can mix playfulness with inquiry and personally craft an understanding of science they feel proud to share.

○ Materials & Engagement Strategies

The only necessary material is standard 8.5- by 11-inch paper. One sheet of paper can be folded and cut to create a small eight-page booklet, as shown in Figure 1. One thing important to note is the unique page order and orientation that results from this folding method. There are other formats for creating and folding zines, and teachers and students can

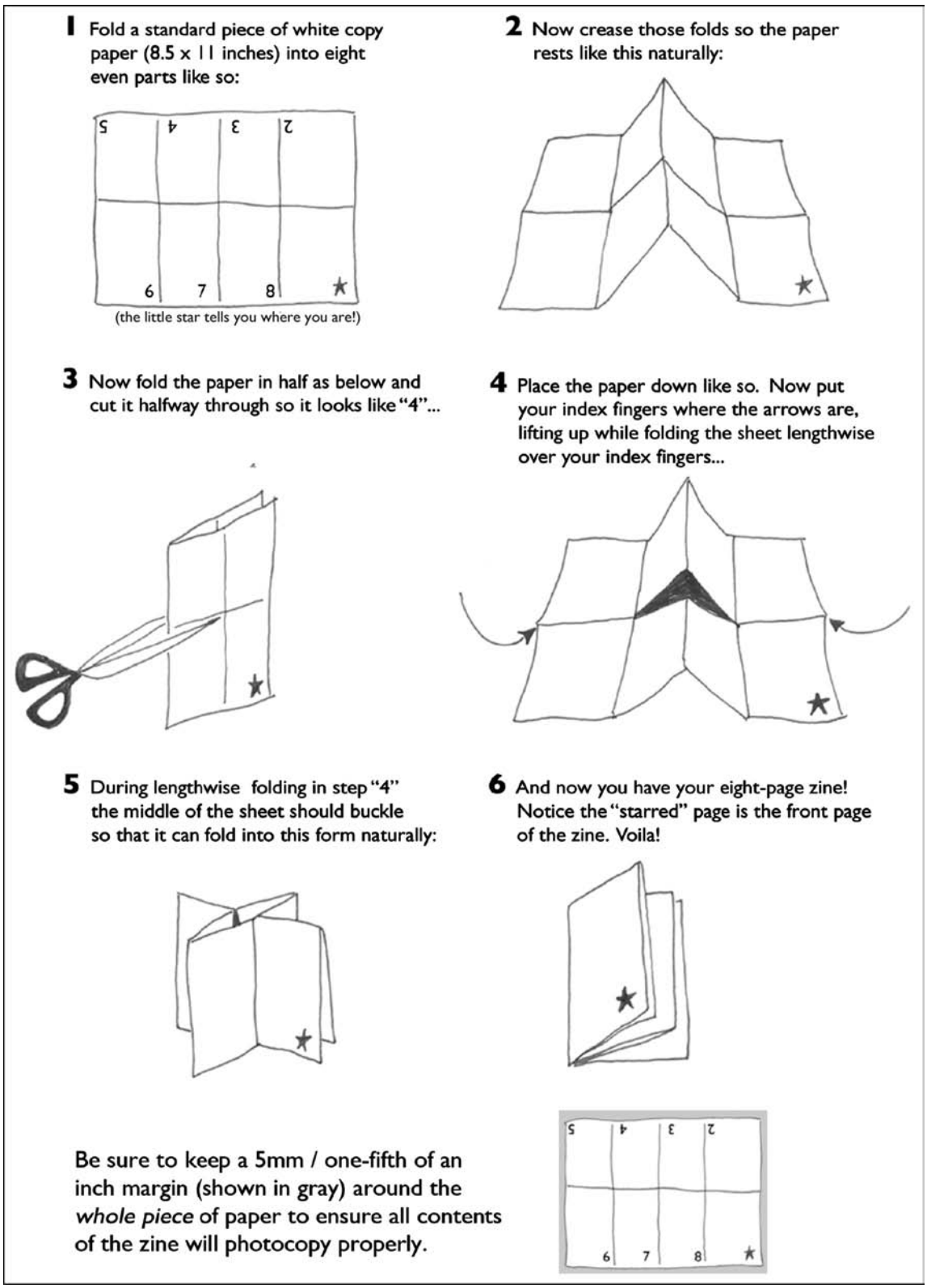

Figure 1. General directions for zine folding, page order, and orientation.

use whatever layouts and designs seem most useful to their project. The format shown here is convenient because it allows a standard-sized sheet of paper to be used to create eight distinct pages on which information can be broken into parts or a narrative can be built. The students can draw with whatever pens, pencils, or other implements they choose, keeping in mind that the quality of any photocopies that result will vary depending on how high-contrast the text and image are. Students can be given the option to draw and write by hand, use images cut and collaged from other sources, employ a word processing program, or combine any of these techniques.

One key advantage of zines is the freedom they gives students in choosing a topic and the format they think will be best to communicate it. For example, the instructor can set a general theme such as biotechnology, genetics, or sustainability, and within that theme the students can select the specific topics they want to explore in more depth. Likewise, the instructor has the option to open or limit the possible forms of the zines as they see fit. Because the use of humor is such an effective communicative strategy, they can take the form not only of comics, but also of instructional pamphlets, faux sales flyers, classified ads, or any number of different forms while still utilizing the eight-page zine format.

○ Procedures

A zine project can take anywhere from a day to several weeks, depending on how much time and attention you want the students to invest in it. There is no set format for undertaking a zine project, but I suggest using a sequence of steps to guide the process: a topic proposal, background research and media analysis, drafts of the written and visual script, and sufficient time for producing a finished and distributable zine. Below are several primary questions that are useful for students to consider as starting points in making a zine.

What topic will make a good zine? Whatever specific topic you choose, make sure it is one that you are interested in and personally curious about. Do research to find useful and credible scientific information as well as imagery that can communicate the scientific ideas. Coming up with a list of three or four topics and comparing them on the basis of background information available and the complexity of communicating the ideas can be of great help in the early stages.

Who will read your zine? Who is your ideal audience? Depending on this, you may want to choose a topic you think they will both be interested in and be able to understand. If you want your six-year-old sister to understand your zine, you will need to use words and images she can understand. If you want both kids and adults to find your zine interesting and learn something from it, you will need to think carefully about words and images that can interest and communicate to both. You can't please or reach every reader, but in imagining who might read your zine and what experience you want them to have, the best design becomes clear.

Why will people want to read your zine? Is it eye-catching? Does it have an interesting title? Think about making it a comic or including intriguing characters that can help tell the story of your scientific idea. Humor is of course a great tool for engaging your reader as you communicate, realizing it is possible to be silly as well as serious at the same time. Use compelling and clear visual images along with text (your own drawings or clip art, etc.). Finally, a zine is only as good as its final design: correct spelling, clear lettering, and correct grammar are all important for reaching others.

○ Assessment

Assessment of zine projects in the context of a course curriculum can also be done in many ways. If the project is structured in specific steps, with a proposal, research brief, and various drafts, this provides a natural means for evaluating whether students are developing a deeper engagement and a more sophisticated understanding of their topic. Such an assessment should not only include the quality of the content from a factual or scientific point-of-view, but also evaluation of what strategies were employed by students for successfully communicating the core ideas to others.

With zines, peer assessment can be very effective and used as part of the educational strategy, since peers not only likely know the general topic to a similar depth, but also, as co-participants in zine-making themselves, have a good sense of the challenges and options in creating them. Indeed, zine projects and their format can easily be tailored for group work and collaborative learning.

Finally, one qualitative assessment for the usefulness of zine projects in science education was the response garnered from an event held last year, the "Year of Science 2009 Zine-a-thon" (see http://www.yearofscience2009.org/about/zine-contest.html, and …/about/zine-winners.html). This event solicited entries from a wide range of age groups, from third grade through adults, in 11 different topic categories, including Biodiversity & Conservation, Sustainability & the Environment, and Body & Health. In response, the Zine-a-thon received over 250 submissions from across the United States as well as from schools in India and Argentina, thus demonstrating the applicability of zines to a variety of ages and cultural contexts. Figures 2–4 show sample pages from zines by students ranging from elementary school to college, and Figure 5 shows a stack of students' science zines.

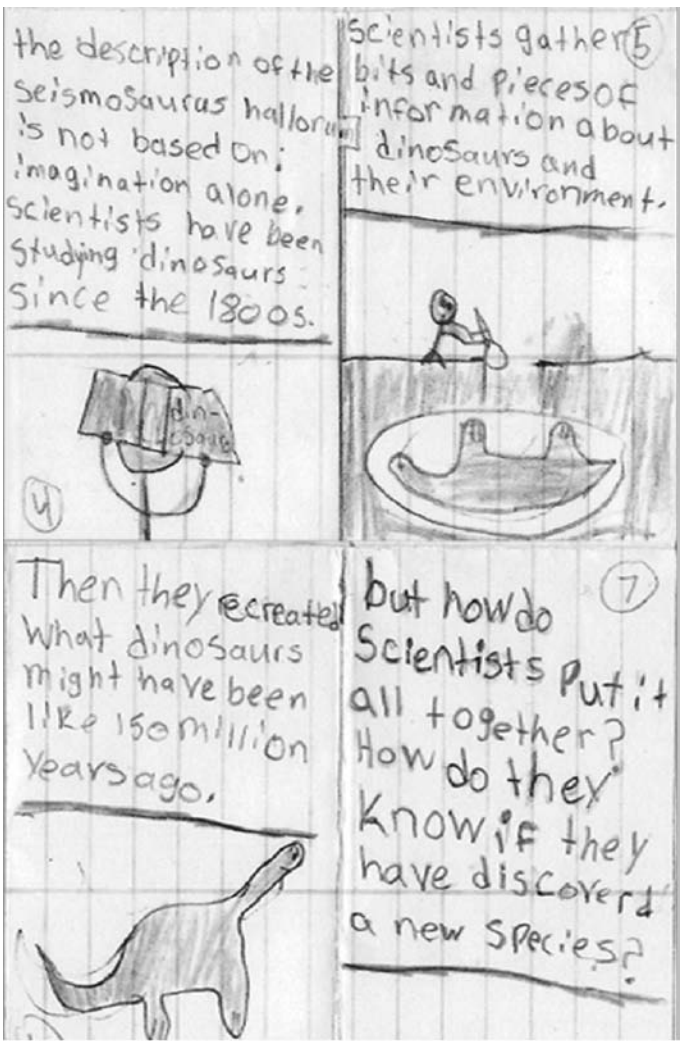

Figure 2. Sample pages from a science zine by an elementary school student, Santino Chavez (Rockford, IL). Titled "Scientific Method in Earth Sciences," it explores the process of evidence in scientific discovery.

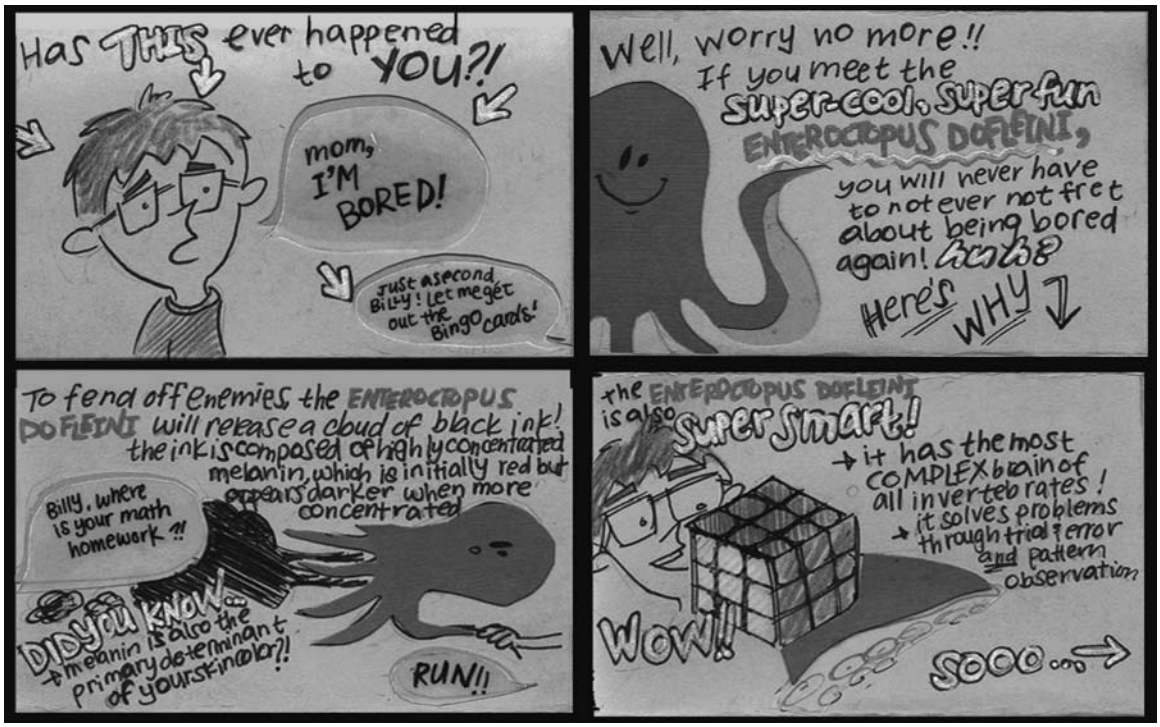

Figure 3. Sample pages from a science zine called "Meeting a Giant Octopus," by high school student Chen Dou (Gaithersburg, MD). It introduces the fascinating biology of marine animals.

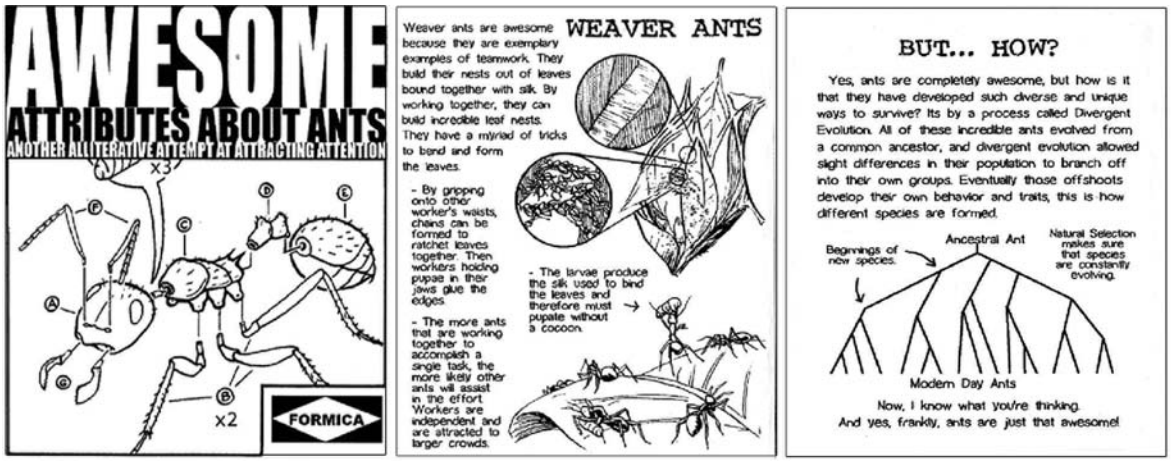

Figure 4. Sample pages from a zine titled "Awesome Attributes About Ants," by college school student Joe Song (Chicago, IL). It examines the diversity of ecological adaptations found in ants and their evolutionary context.

Figure 5. A stack of science zines.

Beyond the popularity of the contest and the overwhelmingly strong response it generated, many teachers commented on the applicability and success of the zines as an educational tool in their science classes. In fact, many of the winning zines came from students who did them as part of a class project. This suggests the benefits of zine-making as an activity that can enhance engagement throughout the class as students compare, contrast, and provide useful feedback to each other's work as it progresses.

As already discussed, zines are an excellent means of student participation in science outreach through individual distribution to family and friends, at local events or locations, and in other community venues. Zine content can also be displayed and made accessible on the Web as printable, foldable PDFs. This is currently being done though project sites like the Small Science Collective (http://smallsciencezines.blogspot.com/). Similar sites could easily be set up by individual schools, classrooms, or students engaged in their own science zine projects.

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