Easy-to-Do Assessment Tasks to Create Info-Posters & Infographics for Communicating Hot-Button Science Issues

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Abstract
Creating info-posters or infographics on science themes, topics, or issues can be used to teach skills that develop students’ creativity and ability to communicate science to the public. The ability to transmit scientific data to a generalist audience or a certain target group is one of the soft skills that need to be cultivated among our students. This article presents simple assessment tasks to create info-posters or infographics.

Key Words: informational poster; learning strategies; science illustration; teaching tools.

Introduction
Communication is an important 21st-century life skill, and so teachers need to make use of teaching tools that will develop students’ information and media literacy skills. For example, scientific information from original research and laboratory-course experiments can be presented as scientific posters (Newbrey & Baltezore, 2006; Herron, 2009; Dorner, 2015) or graphically illustrated as cartoons (dela Cruz & Aril-dela Cruz, 2018), thereby developing students’ presentation and communication skills (Deutch, 2011). The use of info-posters and infographics can also be an effective assessment tool, in the same way that scientific posters have been used in grading laboratory work or as an alternative to a written examination (Mills et al., 2000; Wimpfheimer, 2004; Blackburn, 2019). Informational posters are small posters that typically include both text and graphics designed to be informative and eye-catching to arouse the interests of the viewers, while infographics are visual representations of data for quick and clear dissemination of information. The development and use of visuals is reportedly effective in teaching science concepts (dela Cruz et al., 2012; Macabago & dela Cruz, 2012) and in encouraging students’ creativity and their demonstration of knowledge of new concepts and events (Weidler-Lewis et al., 2018). Therefore, the use of info-posters and infographics in the classroom initiates the learning process and enables students to (1) learn while having fun, (2) exercise their creativity and apply critical thinking skills, (3) work independently or with a partner or in a team, (4) enhance their research capability, and (5) develop skills for science communication. One particular use for info-posters and infographics is to communicate controversial or hot-button science issues.

Procedure
We used this activity for graduate students taking advanced courses in microbiology and for undergraduate students taking a lecture or laboratory course in biology or microbiology. Teachers in other scientific fields (e.g., chemistry, mathematics, physics) can also adapt this activity. Hence, the learning activity could be used across science disciplines and levels.

We developed different assessment tasks for creating info-posters or infographics. The tasks can be assigned to individuals, pairs, or groups. Students can use any artistic medium (e.g., drawing, painting, collage, computer graphics) and/or Microsoft PowerPoint or Adobe Illustrator/Photoshop to create info-posters or infographics. Open-source alternative software includes OpenOffice (http://www.openoffice.org/), Inkscape (https://inkscape.org/), and Gimp (https://www.gimp.org/). Some of the available online resources for creating info-posters or infographics are Piktochart (https://piktochart.com/), Canva (https://www.canva.com/create/infographics/), Infogram (https://infogram.com/), and Venngage (https://venngage.com/). Pinterest also has a wide range of sample infographics from which to get creative ideas (https://www.pinterest.com). The poster could be prepared in a variety of dimensions, from 8.5 × 11 inch paper to 15 × 20 inch illustration board, to the larger posters used in scientific conferences. And with the advent of modern technology, it is also possible to create the next generation of scientific posters, an e-poster, or an interactive poster. Examples of interactive posters were created by a German-based design studio, Science Communication Lab (https://www.scicom-lab.com/).

As students design their posters, remind them to (1) know the target audience; (2) keep it simple but with visual appeal and clarity; (3) make an attention-catching headline; and (4) check facts, figures, and sources. In case the students have limited skills
in illustration, they can ask an artist to illustrate their ideas, provided that the artist's name is credited in the artwork. This is a good opportunity to teach the values of honesty and acknowledging external collaborators. Students also write a 300-word description of their info-poster and/or present the poster in front of the class. This further develops the students' skill in communicating science orally and/or in short written narrative. To gain points, info-posters can be graded on the basis of set criteria (e.g., accuracy of content, originality, creativity) using a rubric designed by the teacher (for sample grading rubric, see Table 1). Peer evaluation can be used to award points. Info-posters can also be showcased in an exhibit during science fairs, and a popular voting system can be put in place for the audience to gain extra bonus points. Alternatively, posters can be posted in social media platforms for public appreciation with “likes” and other emojis. Bonus points can be awarded for the most-liked info-posters or infographics.

**Info-Poster Based on Controversial or Hot Topics**

Hot-button topics or controversial issues are assigned by the teacher as the theme of the info-posters or infographics. Students are tasked initially to gather information about this topic and later create posters aimed to promote or address the issue or to educate against misconceptions (Figure 1). For example, a controversial topic we used in class was the safety of GMOs (genetically modified organisms) or the benefits of genetic engineering in agriculture. The students’ info-posters were designed for the public. If a student’s personal view goes against the topic, an infographic could be assigned to convey information from valid sources. As a learning activity, the info-poster activity teaches students to think critically about the information they gather from varied sources – including how to find reliable sources and how to properly cite references – and to be objective in their presentation. Examples of reliable sources of information include primary literature such as scientific journals and technical reports from valid government websites and organizations. Students should avoid gathering information from Wikipedia, personal blogs, unverified websites, and predatory journals. When writing the narrative of the info-poster, students can cite published journals and follow a standard citation format (e.g., APA or Chicago style). Alternatively, the teacher may provide the topic for the info-poster activity while the students identify their target audience. Examples of topic–target audience combinations include community-transmitted diseases and local communities, the good sides of microbes and kids, and benefits of genetic engineering and farmers. Other hot topics for the info-poster classroom activity include animal testing, safety of vaccines, climate change, habitat destruction, plastic pollution, and evolution. During the classroom presentation of the info-posters, the teacher can give five minutes for the students to discuss their outputs, after which the teacher can follow the Socratic argumentative approach by asking and answering relevant questions related to the presented information.

**Info-Poster from a Reading Assignment or a Delivered Lecture**

Students are assigned reading material from a journal. To test their understanding and ability to convey scientific information, they are tasked to create an info-poster or infographic on the main points

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**Table 1. Sample grading rubric for info-posters and infographics.**

|  |  |  | Weight | Score |
|---|---|---|---|---|
| **Formatting and Creativity** | **3** | **2** | **1** | **Total scores (30 points)** |
| • An appropriate title or headline is used. | • Title or headline is less straightforward. | • Title or headline is vague. | **3 × 3 + 1** | 10 |
| • Text is concise and free of spelling or typographic errors. | • Text is relatively clear but with some spelling and typographic errors. | • Text is hard to read, due to font size or color, with some spelling and typographic errors. |  |  |
| • Layout is easy to follow. | • Layout is not easy to follow. | • Layout lacks organization and is very difficult to follow. |  |  |
| • Poster is colorful and attractive. | • Poster is colorful and attractive. | • Poster is not colorful or attractive. |  |  |
| **Clarity of Theme** | • Information is relevant and well summarized. | • Information is relevant, but connections are not clear. | **3 × 3 + 1** | 10 |
| • All needed information is stated in the poster and clearly presented. | • Some needed information is stated in the poster. | • Little or no information is included. |  |  |
| **Originality, Scientific Merit, and Correctness** | • Very good original thinking is demonstrated. | • Good original thinking is demonstrated. | • No original thinking is demonstrated. | **3 × 3 + 1** | 10 |
| • Correct and accurate information is presented. | • A few mistakes in the presented information were noted. | • Many mistakes on the presented information were noted. |  |  |
or key findings of the article. The students can also illustrate solutions to any issues raised by the paper. For example, we used a colloquium report by the American Academy of Microbiology – “The Fungal Kingdom: Diverse and Essential Roles in Earth’s Ecosystem” (Buckley, 2008) – that listed current issues and proposed recommendations for fungal research. The students choose any of these issues or recommendations and illustrate possible solutions. Alternatively, key take-home points or the main highlights from lectures delivered in the university by invited scientists can serve as the main topic for info-posters or infographics. For example, our invited lecturer talked about the emerging diseases of frogs caused by a fungus. Following the lecture-seminar, students created an info-poster that will raise awareness on the vanishing frog biodiversity due to this fungal disease. Students rallied behind the idea of “Save Our Frogs” with some posters depicting beneficial microbes fighting the disease-causing fungus.

**Conclusion**

Posters have been used to communicate research outputs in scientific meetings and to monitor students’ understanding of course materials in class (Stanton, 2013). Info-posters and infographics can achieve the learning outcomes described here, maximizing students’ learning potential by exercising their creativity, reading and research ability, critical thinking skills, and listening, writing, and oral communication skills. It also provides them the opportunity to bring science to the public as similarly observed with the use of popular culture (del
Cruz, 2014). Lastly, the use of info-posters or infographics in class can be adapted for all educational levels and for material ranging from simple scientific concepts to controversial themes.

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