1-23-2020

Seeing the 'Big Picture': Building Cooperative Visual Literacy in the Undergraduate Biology Classroom

Erica Tietjen
University of Nevada, Las vegas, erica.tietjen@nsc.edu

Seeing the 'Big Picture': Building Cooperative Visual Literacy in the Undergraduate Biology Classroom

Erica S. Tietjen - UNLV College of Education; Nevada State College, Physical and Life Sciences

Best Teaching Practices Expo 2020

The practice and the need it addresses

Why is visual literacy important?

Development of science process skills, such as observation, measurement, classification, experimentation and communication, should be a desired outcome of undergraduate instruction (AAAS, 2011), and the development of scientific visual literacy by interpreting and creating visual representations (e.g. sketches, graphs, models) is an important part of science communication (Arneson & Offerdahl, 2018). However, it is rarely taught explicitly by instructors who are content area experts and may not experience the "diagram/image as a foreign language" that students may perceive (Quillin & Thomas, 2015).

Many students like to engage in the relaxation of drawing for recreation purposes, and this activity gives them an opportunity to combine aspects of visual and spatial representation, creativity, and cooperative problem-solving in a classroom setting. With practice, students can learn to focus on the important concepts of visual representations, and use a variety of forms in their communication.

Evidence this practice benefits UNLV Students

How is this practice beneficial?

Students in my BIOL 189 (Fundamentals of Life Science; NSC), on the first day of class, were given a small unknown drawing (which represented a portion of an animal cell image) and were asked to: (1) work in pairs to translate the image by scaling it up (to letter paper) and then (2) work with their classmates to determine the placement and orientation of their scaled-up drawing to create a larger recognizable image (now a 15-sheet (5x3) letter paper mosaic) (Fig. 1).

Figure 1. Students working together to enlarge, draw and build an animal cell

Students were surveyed following the activity, and reported that they enjoyed the puzzle-solving aspect, as well as the opportunity to draw/color in a manner that was "appropriate for the class" and "for a larger purpose". During student interactions, I observed emergent creative ideas (such as using the original images to help guide placement of the larger mosaic pieces; Fig. 1), suggesting students were deriving additional cognitive benefits from the activity.

Resources and where to find them

Where to find more information?

Suggested practices for teaching drawing for model-based reasoning in biology:
Quillin & Thomas (2015) provide an excellent overview of interventions for drawing-to-learn practices in biology, and model how drawing skills could be scaffolded to help achieve other pedagogical goals in biology.

References:

American Association for the Advancement of Science. (2011). *Vision and change in undergraduate biology education: A call to action*. Washington, DC, AAAS.

Arneson, J. B., & Offerdahl, E. G. (2018). Visual literacy in Bloom: Using Bloom's taxonomy to support visual learning skills. *CBE—Life Sciences Education*, 17(1), ar7.

Quillin, K., & Thomas, S. (2015). Drawing-to-learn: a framework for using drawings to promote model-based reasoning in biology. *CBE—Life Sciences Education*, 14(1), es2.

Please contact me at:

Erica S. Tietjen, Lecturer of Biology
erica.tietjen@nsc.edu

Nevada State College
Be bold. Be great. Be State.

How other UNLV teachers might adopt this practice

How to use this practice in your classroom?

--Whole class discussion followed the activity, with an emphasis on the collaborative and problem-solving nature of science, as well as the fundamental "big picture" importance of the cell in biology.

--This approach could be used in a classroom of any discipline (e.g. History, Communications, Math) to practice visual-spatial skills and problem-solving. Any relevant photo or drawing can be transposed to a grid, from which students can scale up and construct the larger mosaic image (Fig. 2). The mosaic can be constructed on a white board or free wall space, using tape to secure the image and to remain visible during the whole class discussion that can follow.

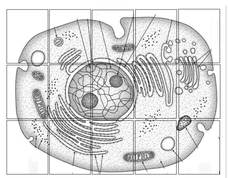

Figure 2. Small-scale gridded cell image (on 8x11 letter paper) used to create the larger scale (15-sheet) mosaic image

--By incorporating drawing opportunities into their classes, instructors can provide students with an additional cognitive strategy for communication, in ways that are engaging and low-risk, while also using cooperative communication skills to solve the visual "big picture."