

Using Crossword Puzzles to Enhance Students' Learning of Technical Biological Terms

WILLIAM D. STANSFIELD

ABSTRACT

The goal of this Quick Fix is to inform biology teachers about the availability of online crossword puzzles that can be used to engage students and help them learn technical biological terms.

Key Words: Engagement; online crossword puzzles; self-evaluation; vocabulary tests.

Students should understand the importance of learning scientific vocabulary (MacKenzie, 2007). Well-defined scientific terms are used for brevity and to avoid misunderstandings. These terms are required knowledge for understanding scientific papers. They are also helpful when preparing students' lab reports or writing assignments. They will be needed to understand local and state-wide tests. The use of online crossword puzzles to enhance learning of technical terms is a rather novel approach, akin to playing games, and thus might be likely to enhance student engagement with biology.

○ Assessments

There are several potential difficulties with assessments that involve explanations of biological structures and phenomena.

(1) The teacher must devote time to test preparation, administration, scoring, and posttest follow-up. (2) Students' answers may be only partly correct (incomplete). (3) Students' answers may be partly or totally wrong. Despite the difficulties, these kinds of tests are the gold standard for assessment of students' understanding and ability to express that understanding in oral and written communications (Cisterna et al., 2013).

Vocabulary tests that present definitions, and ask for the corresponding terms, are far easier to score than the reverse procedure. Teachers should know whether the textbook contains

all the terms they consider essential. Their lesson plans should contain any such terms that are lacking in the textbook. Teachers can provide helpful hints for each term in a test by providing (1) the number of letters in the term; (2) the first letter of the term; and (3) the number of words in the term, if more than one (e.g., Definition: Darwin's evolutionary mechanism [2 words]; Term: "natural selection").

○ Online Crossword Puzzle Examples

Online crossword puzzles can be assigned as homework to supplement or reinforce terms presented in class or textbook. Students can work at their own paces and collaborate with other students if they wish. There are many online sources of crossword puzzles devoted to biology or any of its disciplines. The one I found most useful is titled "Wayne's Word" (<http://waynesword.palomar.edu/crossword.htm>). Categories are cells and mitosis, DNA, cell structure and function, plant and animal life cycles, ecology, adaptations, supermarket botany, evolution, and more. These puzzles may contain terms unrelated to biology or terms too technical to be encountered in high school biology textbooks. Teachers could inform students of those terms that should be eliminated for the purposes of the course, to help avoid student discouragement from trying to answer questions for which they have insufficient

background. Answers to the puzzles are available online for self-evaluation (<http://waynesword.palomar.edu/crossword1.htm>). Wayne's Word contains numerous biological articles and full-color photographs that students and teachers may find very interesting and engaging. For example, students may be amazed by the topics under the heading Botanical Record-Breakers (<http://waynesword.palomar.edu/ww0601.htm>). Teachers should not miss

the opportunity to explain to students how solving crossword puzzles is analogous to solving scientific puzzles (Pavlova & Lewis, 2013).

Well-defined scientific terms are used for brevity and to avoid misunderstandings.

References

- Cisterna, D., Williams, M. & Merritt, J. (2013). Students' understanding of cells & heredity: patterns of understanding in the context of a curriculum in fifth & seventh grades. *American Biology Teacher*, 75, 178–184.
- MacKenzie, A.H. (2007). Explaining the role of vocabulary in the biology classroom. *American Biology Teacher*, 69, 262–263.
- Pavlova, I.V. & Lewis, K.C. (2013). An easy and fun way to teach about how science “works”: popularizing Haack’s crossword-puzzle analogy. *American Biology Teacher*, 75, 397–401.

WILLIAM D. STANSFIELD is Emeritus Professor of Biological Sciences California Polytechnic State University, San Luis Obispo, CA. E-mail: wstansfi@calpoly.edu. Current address: 653 Stanford Dr., San Luis Obispo, CA 93405-1123.



THE NATIONAL ASSOCIATION OF BIOLOGY TEACHERS thanks its affiliate organizations for their support and for their efforts to further biology & life science education.

NABT Affiliate Members

- Biology Teachers Association of New Jersey (BTANJ)
- Cleveland Regional Association of Biologists (CRABS)
- Colorado Biology Teachers Association (CBTA)
- Connecticut Association of Biology Teachers (CTABT)
- Delaware Association of Biology Teachers (DABT)
- Empire State Association of Two-Year College Biologists (ESATYCB)
- Hong Kong Association of Biology Teachers (HKABT)
- Illinois Association of Biology Teachers (IABT)
- Illinois Association of Community College Biologists (IACCB)
- Indiana Association of Biology Teachers (IABT)
- Kansas Association of Biology Teachers (KABT)
- Louisiana Association of Biology Educators (LABT)
- Massachusetts Association of Biology Teachers (MABT)
- Michigan Association of Biology Teachers (MABT)
- Mississippi Association of Biology Educators (MABE)
- New York Biology Teachers Association (NYBTA)
- South Carolina Association of Biology Teachers (SCABT)
- Texas Association of Biology Teachers (TABT)
- Virginia Association of Biology Teachers (VABT)

youthankyouthankyouthankyouthankyouthankyou



ec·o·sys·tem noun:

the complex of a community of organisms and its environment functioning as an ecological unit.

NABT ecosystem noun:

a complex community of biology teachers interacting through a digital interface.

The **NABT ecosystem** offers new ways for you to learn and share with your colleagues:

Resources: Do you know of a great, free resource you want to share? Post a link to it in the Resources Section. The more Resources that are posted, the more you can help and be helped by the ecosystem.

Events: Looking for something local? Looking for something national? Highlighted conferences and workshops are posted for your review.

Members Like Me: You are not alone. Easily find members in your area or in similar professional settings and contact them using ecosystem email.

Discussions: Sometimes you just need to talk. Focused discussion groups are being added frequently.

The **NABT ecosystem** is one more way NABT is supporting a diverse community of educators focused on the teaching of biology and life science.

All biology teachers are welcome to join the **NABT ecosystem** by visiting

www.NABT.org/ecosystem

Get connected today!

The NABT ecosystem was made possible with the support of the NIH National Human Genome Research Institute, and replaces the Community of Genetics Educators (CoGE).