Form & Function: Drawing to Learn in Biology

Historical Use of Drawing in Science

Massachusetts Drawing Act of 1870
- One of nine essential subjects
- Mechanical, industrial drawing
- Included with science & math, not humanities

NCSU Requirements for science majors (1890)
- Drawing 1 hour daily to “learn to observe... the little details incident to agricultural pursuits”

... and for 40,000+ years
Historical Use of Drawing in Science

Massachusetts Drawing Act of 1870
- One of nine essential subjects
- Mechanical, industrial drawing
- Included with science & math, not humanities

NCSU Requirements for science majors (1890)
- Drawing 1 hour daily to “learn to observe... the little details incident to agricultural pursuits”

... and for 40,000+ years

Drawing Helps...
Focus, Communicate, Process, & Remember

“Animacules”
By A. Leeuwenhoek

DNA
By F. Crick

Evolutionary Tree
By C. Darwin
Three Ways to Use Drawing in Class

1. Biological Illustration
2. Doodl-Ed
3. Complete-the-Image

Goals of Biological Illustration

• Develop Observational Skills
• Focus on Nature
• Recognize/ID Biodiversity
• Overcome Plant Blindness
• Learn Anatomy Actively (create vs. label)
• Use Microscopes
Goals of Biological Illustration

- Develop Observational Skills
- Focus on Nature
- Recognize/ID Biodiversity
- Overcome Plant Blindness
- Learn Anatomy Actively (create)
- Use Microscopes

How the course works

75 minute lecture (with sketching)  
+ 3 hour lab/studio (for illustrations)

Field trips

Topics:
- “How to draw” & “how to write/research”
- Invertebrates (insects)
- Vertebrates (comparative skeletons)
- Plants

EOS: Portfolio & Exhibit
The Results...
The Results...

A. Casper

M. Jordan

J. Lang

K. Quinn

The Results...

T. Brown

A. Brosnan

[Description of images and diagrams related to scientific topics, such as marine biology and the life cycle of an insect, with relevant labels and captions provided.]
Student Comments ...

“In illustrating the vampire bat’s teeth, I found myself very interested in... anesthetics in saliva, biting techniques, and tongue structure.”

- Biomed. Engineer. major

“There is so much detail in the world that I missed prior to this class, but now I don’t - and it makes my days so much more vibrant.”

- Biology major (Sr.)

Student Comments ...

“I find myself paying much more attention to contrast, scale and interesting forms in everything from landscaping on campus to bugs.”

- Art+Design major

“Now that I’ve learned about all these diverse groups, I feel that I’m seeing the world differently.”

- English major
The Educational Benefits...

- Improves observation
- Focus on detail & accuracy
- Develop visual/verbal communication skills
- Connect with nature
- Encourage intrinsic motivation
- Long-term learning (autobiographical memory)

Three Ways to Use Drawing in Class

1. Biological Illustration
2. Doodl-Ed
3. Complete-the-Image
Information-Rich Visuals:
- Anatomy (form & function)
- Life Cycles
- Graphs
- Content organization

- Reduces cognitive load
- Understand abstract info
- Break up notes
- Fun!
Three Ways to Use Drawing in Class

1. Biological Illustration
2. Doodl-Ed
3. Complete-the-Image

### Complete-the-Image

- Process information, rather than memorize (learned-visual different from activity-visual)
- Relate form & function
- Increase brain region recruitment

“The most effective learning involves recruiting multiple regions of the brain for the learning task.”
- D. Kaufer, UC Berkeley
BONUS: Sketchnotes

Our instruction has a **Function**; Drawing gives it a **Form**

---

**Thank You!**

Jennifer Landin, PhD  
EMAIL: jmlandin@ncsu.edu  
WEB: jmlandin.com  
BLOG: rednewtgallery.wordpress.com