Talk given by Jennifer Liang at the 11th International Conference on Zebrafish Development and Genetics, June 2014, Madison, WI.
College Students

- Leadership
- Cooperation
- Public speaking
- Chance to be a mentor
- Organization

Passing on love for science

K-12 Students

- Scientific method
- Learn genetics
- Live animals
- Fun

Meet college students
The Particulars

- 5 undergraduate students
- 2 undergraduate teaching assistants
- 1 professor

Discussion/Planning
- Wednesdays 1:00-1:50
- Fridays 1:00-1:50

Classroom visits/Practice
- Fridays 9:00-12:50

One semester
- 12 grade AP Biology: 33 students
- 7th grade Biology: 158 students
- 5th grade science: 107 students
- Kindergarten: 43 students
- 1st grade: 90 students
- 2nd grade: 64 students
- Total: 495 students
All based on GloFish®

http://www.glofish.com

Can buy them in almost any pet store
Can breed them for educational purposes
  (http://www.glofish.com/our-company/license-notice/ )
Beautiful colors under room lights
Glow/Fluoresce under specific wavelengths of light
Great for teaching genetics
Need animal protocol***
Why do Glofish fluoresce?

1. and/or

2. DNA

3. Injection

4. Fish

http://www.Glofish.com
Hands on

Close match to AP Biology exam
Mendelian genetics
Punnet squares
Chi-square analysis
Animal: Polar bear
Number: 110

Circle one: beginning of class  end of class

Please read each statement carefully and circle the number that indicates how much you AGREE or DISAGREE with that statement. Please circle ONLY ONE number for each statement.
Inheritance

MN Science Standard  5.1.1.2.  
Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.
Genotype

MN Science Standard 5.1.3.4:
Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.
MN Science Standard 5.4.1.1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.
MN Science Standard 5.4.4.1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.
Biologists use math in their research.
Observation is a useful tool in research.
Fluorescent organisms can help us understand the world.
You are a product of both your mother and your father.
I can imagine myself as a scientist.

* P < 0.05
Draw a Scientist

Used with 2nd grade students
Thanks to Chris Pierret at InSciEd Out for this idea
Reflection and advice

Form a team that stays together for the whole semester
- group had time to develop a chemistry/group dynamic
- team members gets to try a variety of roles and tasks
- made it easier to walk into a new classroom with confidence

Why take this class
- Learn to think on your feet and adapt
- Will never be afraid to talk in front of a class again
- K-12 students will surprise you & excited to have you there

Insights into learning
- Complex ideas are better introduced in small groups
- Keep writing to a minimum (especially if time is short)
- 45 minutes is a tough timeline – negotiate for more
Thank you

Amelia Anderson
Alisa Brakic
Jayce Brown
Rebecca Goeman
Mitch Johnson
Alison Kingsbury
Morgan Prochaska

Teachers: Cynthia Welsh, Cynthia Edwardson, Wendy Carter, Kathleen Lofstuen, Jeremy Freise, Heather Lindstrom
Zebrafish in the Classroom (www.zfic.org)
University of Minnesota  Duluth Biology Department