Adventures in Triage

Pandemic Lessons for Robust and Flexible Course Design in the Natural Sciences (and Beyond)

ACS Summer Virtual Workshop Series (June 23, 2021)
Hit record!
Adventures in Triage
Pandemic Lessons for Robust and Flexible Course Design in the Natural Sciences (and Beyond)

ACS Summer Virtual Workshop Series (June 23, 2021)
Welcome to the workshop!

Dr. L. Andrew Bell
Technology Consultant, Pedagogy & Scholarship
University of Richmond
abell4@richmond.edu

Dr. KatieAnn Skogsberg
Associate Professor of Behavioral Neuroscience
Centre College
katieann.skogsberg@centre.edu

Dr. Kim McArthur
Assistant Professor of Biology
Southwestern University
mcarthuk@southwestern.edu
Okay ... what just happened?

The pandemic forced us to be flexible in our teaching.

What did we learn?

Flexibility supports a more robust and inclusive course design, but managing flexibility can be a challenge!
Workshop Goals:

1) Share our experiences incorporating flexibility into our courses.

2) Think ahead: how do we want to approach flexibility in our courses, going forward?
What do we mean by flexibility?

Flexibility in how we deliver course content, share course materials, and communicate with students.

Flexibility in how we inspire, facilitate, and assess student learning outcomes.

Flexibility in how students earn their final course grade.
Sharing Our Experiences ...

Dr. L. Andrew Bell
Flexible Course Logistics

Dr. KatieAnn Skogsberg
Flexible Assignments and Assessments

Dr. Kim McArthur
Flexible Course Grading
Flexible Course Logistics

Dr. L Andrew Bell
Technology Consultant, Adjunct Professor
University of Richmond
abell4@richmond.edu
Three Specific Areas to Create Flexibility in Your Course Logistics

1) Organized Course Content
2) Flexible Platforms for Group Learning Activities
3) Virtual Office Hours
Organized Online Course Content Facilitates Flexible Consumption
Organized Online Course Content Facilitates Flexible Consumption

1) Organize by modules
2) Organize modules around learning objectives
3) Use weblinks when possible
4) Be the *only* place for course content
Collaborative Documents Provide Flexible Platform for Group Learning Activities
Collaborative Documents Provide Flexible Platform for Group Learning Activities

1) Identify objective of learning activity
2) Utilize collaborative documents to facilitate learning activity
3) Link to collaborative documents before class
Virtual Office Hours

Promote Flexible Student Engagement

1) Communicate early and often
2) Use Personal Meeting room
3) Use a scheduling tool
4) Consider both individual and group hours
Authentic Assessments

Dr. KatieAnn Skogsberg
Associate Professor of Behavioral Neuroscience
Centre College
katieann.skogsberg@centre.edu
Authentic Assessments

- Prior to Pandemic:
  - Traditional Exams

Photo by Museums Victoria on Unsplash
Authentic Assessments

● Prior to Pandemic:
  ○ Traditional Exams
  ○ Malcolm Gladwell’s Revisionist History (Season 4)
    ■ Puzzle Rush & The Tortoise & the Hare
    ■ Daniel Kahneman’s Thinking Fast & Slow
Authentic Assessments

● Prior to Pandemic:
  ○ Traditional Exams
  ○ Malcolm Gladwell’s Revisionist History (Season 4)
    ■ Puzzle Rush & The Tortoise & the Hare
    ■ Daniel Kahneman’s Thinking Fast & Slow

● Questions:
  ○ Do my exams favor “Hares” and penalize the “Tortoises?”
  ○ Are my assessments Authentic?
Authentic Assessments

● Pandemic!
  ○ Everything Online
  ○ No way to proctor exams or ensure integrity

Photo by engin akyurt on Unsplash
Authentic Assessments

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● Courses
  ○ Introduction to Psychology:
    ■ Prerequisite for PSY and BNS majors, Gen-Ed for non-majors
    ■ Eager First-Years to Ambivalent Seniors
  ○ Sensation & Perception (Neuroscience):
    ■ Elective for BNS majors, satisfies BNS requirement for PSY majors
    ■ Eager BNS majors and Ambivalent PSY majors
Authentic Assessments

● Solution: “Artifacts”
  ○ Started with Backwards design
    ■ What do I want them to be able to do?
      ● Demonstrate mastery of the topic in a way that is personally relevant or applicable to real-world problems.
  ○ How do I get non-majors interested and invested?
    ■ Any format: film, photo, podcast, computer program, model, poetry, short-story.
    ■ For those who needed structure: Infographic, analysis paper, research proposal.
Examples

A Tough Pill to Swallow shows the tragic reality of cigarette consumption and negative health outcomes and encourages the viewer to think critically about decisions regarding their health. The image depicts a positive correlation between the number of cigarettes consumed and the number of pills taken over time. This relationship shows that the use of cigarettes is correlated with the need for medical intervention. Additionally, the placement of the cigarettes and pills on a desk chair shows how one may feel stuck in place when experiencing health issues and fall into a trap of low exercise levels, which again feeds into health problems. The piece also begs the question of why so many people smoke. Forms of cognitive bias may influence the risk a smoker perceives in the moment. For example, if one is not experiencing a negative health impact in the current moment, they might fall into the trap of confirmation bias, where they assume that since the cigarettes are not showing problems yet they must be fine. Over time people develop major health problems because of falling into this trap.
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Examples

**The Need Hierarchy**

- Maslow's Need Hierarchy
- Maslow's Need Hierarchy

**Abraham Maslow's Hierarchy of Needs**

1. **Physiological Needs**
   - Food
   - Water
   - Shelter
2. **Safety Needs**
   - Security
   - Protection
3. **Love and Belonging Needs**
   - Belonging
   - Friendship
4. **Esteem Needs**
   - Respect
   - Achievement
5. **Self-Actualization Needs**
   - Actualization
   - Personal Growth

**Maslow's Hierarchy of Needs**

- Self-actualization
- Love and belonging
- Safety
- Physiological

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**Maslow's Hierarchy of Needs**

- Self-actualization
- Love and belonging
- Safety
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Examples

**The Need Hierarchy**

- Maslow's Need Hierarchy
- Herzberg's Two-Factor Theory
- McGregor's Theory X and Theory Y

**Maslow’s Need Hierarchy**

- **Basic Needs**: Physiological, Safety, Security, Belongingness
- **Growth Needs**: Esteem, Self-actualization

**Herzberg's Two-Factor Theory**

- **Hygiene Factors**: Salary, supervision, interpersonal relations, working conditions
- **Motivators**: Recognition, achievement, responsibility, growth

**McGregor's Theory X and Theory Y**

- **Theory X**: Employees are lazy, need close supervision, dislike work
- **Theory Y**: Employees are self-motivated, can be trusted, enjoy work

**DIY Research**

- **Research Question**
- **Research Design**
- **Data Collection**
- **Analysis**

**So you're doing your daily life and then all of a sudden a burning question sticks to your mind...**

- **Hypothesis**: A question is an hypothesis. A research question is a hypothesis that is testable.

**Next you need to check your hypothesis**

- **Literature Review**: Find relevant sources to your hypothesis and read them.
- **Formulate a research question**: Refine your hypothesis into a research question.

**Picture of a model**

- **Theory X**: Employees are lazy, need close supervision, dislike work.
- **Theory Y**: Employees are self-motivated, can be trusted, enjoy work.

**Hypothesis testing**

- **Formulate a research question**: Refine your hypothesis into a research question.
- **Literature Review**: Find relevant sources to your hypothesis and read them.

**Next you need to check your hypothesis**

- **Literature Review**: Find relevant sources to your hypothesis and read them.
- **Formulate a research question**: Refine your hypothesis into a research question.
Examples

Fechner’s Law

The graph of Fechner’s law curves sleepily at first
like a lower lip inflated with grief, a calloused toe, the back of a stretching cat,
the jawbone of a horse. But the surprise is in the asymptote that drifts off our margins.
It’s the part that flattens, plateaus into the infinite limits of our undetections. In a whisper, even
taps of melting ice on the porch resound like explosions. But the louder you yell, the less I’m able
to tell the difference, my difference thresholds dissolving. My neurons can only fire so fast,
a sprinkler system of action potentials blocks the limits of my perceptions, builds a ceiling. When
pushed with such great force, I can’t tell the difference. We numb ourselves to change, stretching our
bodies onto the leveled logarithm. Tell me this isn’t the reason why five hundred thousand deaths means
less to my brain than the grey and white fur flattened into the snow on the blacktop. How when we have so
little, the impossible purr of a cat feels like the waking rumble of a universe ready to restore us. But in reality,
amidst all the noise and pressure, all the signals go unnoticed. The line on Fechner’s law flattens like the
monitors besides hospital beds. From such sensory overload, it takes so much more to perceive. The truth is
we have no idea the noise of the world. How much more bitter it was than last year. A lemon in the arch of my foot
feels like comfort. As intensity grows, it takes more and more for that just noticeable difference. Adding a brick
to the chimney on my chest feels no different, as the firing of my neurons has already become a conflagration.
**Examples**

**Fechner's Law**

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**Weber's Law**

How much dirt would I need to add to the coffee for you to taste it?
How much more can I turn the hot knob in the shower for you to feel it?
How much lower must the sun sink to notice it's getting dark?
How many days without showering will it take for you to smell me?

What I want is an absolute threshold.

How much do you have to tighten the banjo string to hear the pitch rise?
How many textbooks do I have to stack on my head to feel my skull caving in?
How much lemon do I need to add to your sweet tea for you to taste my sourness?

Give me differenze Limen.

The truth is,
as the magnitude of a stimulus increases,
the difference threshold does too,
in a predictable proportion.

I sit
feeling the weight of my standards.

For most senses, its ratio
to the difference threshold remains constant.
Or at least, that's what the Weber fractions told me.

Oh, K.

But still I wonder,

- serving up
- muddy coffee and acidic black tea
- in the hot water darkness
- with sweaty crevices,
- studying psychophysics
- to the always out-of-tune banjo.
Authentic Assessments

- Keys to making it work:
  - Clear expectations & having a good rubric:
    - Terms defined & applied correctly, APA format, grammar & typos.
    - Glossary
  - Specifications Grading & 2^{nd} Chances
Authentic Assessments

- Keys to making it work:
  - **Clear expectations** & having a **good rubric**:
    - Terms defined & applied correctly, APA format, grammar & typos.
    - Glossary
  - **Specifications Grading & 2nd Chances**

- **Student Feedback**:
  - Challenging & time consuming
  - More enjoyable than traditional exams or papers
  - Felt as though they learned more from making artifacts than studying for traditional exams.
Flexible Course Grading

Dr. Kim McArthur
Assistant Professor of Biology
Southwestern University
mcarthuk@southwestern.edu
Flexible Grading (Course-Wide)

- Flexibility in how the final grade is earned, with multiple paths to the same course grade → contract grading
- Emphasis on feedback and self-assessment over points and static evaluations → “ungrading” or specifications grading
# Upper-Level Biology Elective (Fall 2019)

## Course Grading Overview

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Exams (10/8 and 11/12)</td>
<td>200 pts total (20%)</td>
</tr>
<tr>
<td>Lecture Discussion Preparation:</td>
<td></td>
</tr>
<tr>
<td>Reflect on assigned readings,</td>
<td></td>
</tr>
<tr>
<td>dev bio relevance prior to in-class</td>
<td></td>
</tr>
<tr>
<td>discussions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200 pts total (20%)</td>
</tr>
<tr>
<td>Semester-Long Project: Organogenesis Mini-Review</td>
<td>250 pts total (25%)</td>
</tr>
<tr>
<td>Proposal + annotated bibliography (75 pts)</td>
<td></td>
</tr>
<tr>
<td>Partial draft: introduction, 3 subsections</td>
<td></td>
</tr>
<tr>
<td>(75 pts)</td>
<td></td>
</tr>
<tr>
<td>Final draft, due as final exam (100 pts)</td>
<td></td>
</tr>
<tr>
<td>Lab Journal Club Presentations x 2 (group presentations)</td>
<td>150 pts total (15%)</td>
</tr>
<tr>
<td>Collegiality (lecture + lab)</td>
<td>100 pts (default!)</td>
</tr>
<tr>
<td>Lab Portfolio (group work + contributions)</td>
<td>100 pts total (10%)</td>
</tr>
</tbody>
</table>
My Experience: Contract Grading in Spring 2021

● Goal #1: More fully align my approach to grading with course learning objectives
  ○ Time spent giving individual feedback vs. “one point or two?”
  ○ Accumulating points without achieving all learning objectives

● Goal #2: More fully align my grading scheme with my values as an instructor
  ○ Follow the money! Follow the points!
  ○ Assess where students end up, not where students begin
# Upper-Level Biology Elective (Spring 2021)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>D-/D/D+</th>
<th>C-/C/C+</th>
<th>B-/B/B+</th>
<th>A-/A/A+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistently prepare for class, attend class, and actively</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>participate during in-class activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conduct yourself at all times with collegiality and integrity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maintain a contemporaneous learning notebook and electronic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>portfolio of all submitted work, with assignments completed in a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>timely manner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stay in regular communication with the professor, and attend at least</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>two one-on-one consultations during the semester</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make meaningful and equitable contributions to high-quality work in your</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>lab work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete a final comprehensive self-assessment, reflecting on your work</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>this semester and justifying your proposed earned grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete organogenesis project draft</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Complete green category assignment draft</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Complete orange category assignment draft</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Complete purple category assignment draft</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
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Assessed via Learning Notebooks and Final Self-Assessments

Assessed as Meets Expectations or Needs Revision
Breakout Rooms

In small groups, use Jamboard prompts to discuss flexible course design.

Leave your ideas, comments, questions, and concerns on the Jamboards.

We’ll discuss some questions in the main group at the end of the workshop, and we’ll also address questions in an updated resource document post-workshop.
If you’d like to share resources or examples of flexible course design, please email your contributions to ...

Andrew Bell
abell4@richmond.edu

By Friday, June 25