TEACHING AS COACHING

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Statement for Panel:
Vis, The Next Generation:
Teaching Across the Researcher-Practitioner Gap
IEEE Vis 2015
Do you go to a yoga (or spin/karate) class and just take notes?

Active learning means we all sweat!
In a traditional classroom, learning is a solo contest.

It’s a battle of the student against the exam.

Those of us in academia were able to thrive in this environment, or we wouldn’t be where we are.
I prefer now to think of teaching as coaching, the way it is done in athletics.

Often it is a team sport.

We make it ok to fail and retry and redo.

We sweat together.
Active Learning Improves All Aspects of Learning

"Improved Learning in a Large Enrollment Physics Class", Deslauriers et al., Science 2011

- Attendance: Control 53 vs. Experimental 75
- Engagement: Control 45 vs. Experimental 85
- Learning: Control 41 vs. Experimental 74
Many small preparatory exercises

Students earn points

Good faith efforts can be redone
Why is Active Learning Like Coaching?

• Let students repeat problems until they get them right.
• Make failing fast, fun, easy to recover from.
• Provide as many practice problems as needed.
• Create dynamic difficulty levels that can be personalized based on how students are doing.
• Focus on the feedback rather than the grades.
Peer Learning: Students talk with Peers
Discussion forum / Large lecture

Small group discussion

Coetzee, Lim, Hartmann, Fox, Hearst, "Structuring interactions for large-scale synchronous peer learning, CSCW 2015"
Exercise: Rate Bar Charts and Radar Plots for the Following Visual Tasks:

- Presenting Information
- Comparisons
- Organizing/Ordering
- Relationships/Correlations/Trends
- Showing Exceptions
D3 Fisheye Grid:
Exercise: what is going on here?

http://bl.ocks.org/mbostock/2962761/
4 Units of Conceptual Material

4 Larger Assignments & Software Tools

Perceptual / Cognitive principles

Charting basics

Data types

Narrative

Saliency

Gestalt Properties

Data Wrangling

Exploratory Data Analysis

Multidimensional Visualization

Animation

Advanced Topics

Highcharts.js

Illustrator

Tableau

d3.js
“Objectively Evaluated Viz” Assignment

• Idea: have outsiders answer questions about data based on students’ designs, rather than instructors’ or students “subjective” judgements.

• Method:
  • Give students one dataset
  • Make up a set of questions about that data
  • Put students’ designs on a crowdsourcing platform
  • See how many questions answered correctly

• Also
  • (Based on study by Dow et al. 2011, that students read)
  • Have students first design individually
  • Give instructor feedback
  • Then pair up students
  • Have them create new designs together
Final Projects Unite These Concepts and Skills

Jeopardy! (Poster By Appleman et al. in IEEE Infoviz 2015)

Menu Journeys (Following Slides)

Turn out to be similar to the narratives described by Segel and Heer 2010
WHAT'S IN THE ARCHIVE

In total, here were the number of menus, dishes, and years that the NYPL collection contained.

17,544 Menus
1,331,458 Dishes
157 Years
Menu Item Clustering into Food Groups

Click points to drill down. Source: NYPL.
Menu Item Clustering into Food Groups
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Price of Dishes over Time

How did the average prices for each dish cluster change over time?

The graphs below chart the average price of dishes in each cluster (looking at the 50th percentile, disregarding outliers) over time. This data is contrasted with the inflation of the Consumer Price Index over time, from 1904 to the present day. It can be generally noted that dish prices have increased with inflation, but there is volatility during certain time periods and variation across the clusters.

Mapping Dish Price Against Inflation

You can filter the dish price by name.

Legend:
- Dish Price
- Consumer Price Index
- Menu Cluster
  - (All)
  - americanfood
  - asianfood
  - apples
  - bananas
  - boiledpotatoes
  - cereal
  - cheese
  - chocolate
  - cocoa
  - coffee
  - confectionaries
  - dairy
  - fish
  - greens
  - legumes
  - lettuce
  - meat
  - milk
  - olives
  - orange
  - radishes
  - tomatoes
  - tea
Fruit rose steadily over time, from a bottom-of-the-menu staple to a dish that could appear anywhere. Oranges kept pace until the postwar period, when they fall back down to the bottom of the menu.
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Modern Menu Comparisons

How do the NYPL's top dishes stack up against modern menus?

Finally, we wondered how the historical menu data might match up with today's cuisine. So we scraped menu data from more than 1,000 restaurants in San Francisco from spring 2015, ranging from top spots like Gary Danko all the way down to corner sandwich shops. We then used the same criteria to group dish names as we did for the NYPL dataset to see how prevalent its Top 25 dishes are on a modern set of menus.

How SF stacks up

A modern twist: How do present-day menus match up? Let's find some grub. Who's with me? Colony, anyone?

Tea, filet, and cheese plates remain strong on San Francisco menus, but good luck finding a plate of radishes, celery, or olives in 2015.

NYPL Top 25 Dishes vs. Current SF Menus (Spring 2015)
Sample size: 1,855 menus with 52,622 total dishes

<table>
<thead>
<tr>
<th>Dish</th>
<th>NYPL Count</th>
<th>Current Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tea</td>
<td>201</td>
<td>140</td>
</tr>
<tr>
<td>Plant-Prize</td>
<td>111</td>
<td>160</td>
</tr>
<tr>
<td>Cheese</td>
<td>111</td>
<td>79</td>
</tr>
<tr>
<td>Coffee</td>
<td>79</td>
<td>79</td>
</tr>
<tr>
<td>Pesto</td>
<td>67</td>
<td>67</td>
</tr>
</tbody>
</table>
Summary

• Active + peer learning has hundreds of papers of pedagogical support.

• Incorporated it into my graduate infoviz course.

• Combine concepts from research with ideas and tools from practice.

• This is influencing my research too.

• Think of teaching as coaching is better for students … and for me!