Teaching with Data

Resources and Strategies for Faculty Teaching Undergraduates

Katharin Peter, USC Libraries
Katherine C. Guevara, CET
Robert Sweeney, CET
“Bottled Water: Worse for You, Your Wallet and Your Planet”
Figure 4: An example of a city, Pendleton, that is experiencing the Urban Heat Island effect.

Source: CET Assignment Repository
The medical device market is expected to reach $440 billion worldwide by 2018, a 43.7% increase from today’s value.

Only 37.7% of people with a visual disability are employed.

50% of the U.S. population aged 75 and over suffer from disabling hearing loss.

Source: CET Assignment Repository
Today

1. Data and other resources for teaching & training
2. Instructional design for data assignments
3. Student motivation
Teaching with Data: Home
Resources & Strategies for Faculty Teaching Undergraduates

Guide Overview

This is the companion guide to the Keeping Current at the USC Libraries presentation on November 17th, 2015. Guide includes:

- Data Sources
  Readily available numeric data sources for a variety of disciplines and skill levels
- Teaching Resources
  Resources geared to faculty teaching data assignments
- CET Assignment Repository
  Assignments created by faculty recipients of the Provost's Data-Driven Assignment Grant Program in Spring 2015

Presenters

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USC Libraries
University of Southern California

- Presentation Slides (PDF)
- Instructional Design for Data-Driven Assignments, CET Handout

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Resources: Public Data

Source: http://data.gov
Resources: Library Collections

Source: Data-Planet Database
Resources: Library Collections

1. Government and administrative
2. Business and industry
3. Social surveys and public opinion
4. Easy mapping databases
<table>
<thead>
<tr>
<th>Task</th>
<th>Sample Activity</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate and understand statistics</td>
<td>Use public opinion polls to investigate a social issue</td>
<td>Pew Research Center</td>
</tr>
<tr>
<td>Describe a place, population, incident, or issue</td>
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<tr>
<td>Analyze a dataset and communicate findings</td>
<td>Conduct secondary data analysis of an existing social survey</td>
<td>ICPSR data archive</td>
</tr>
</tbody>
</table>
Activity: Investigate Social Issues

Source: http://pewresearch.org
Activity: Investigate Social Issues

A majority of Americans envision a future made better by advancements in technology

When asked for their general views on technology’s long-term impact on life in the future, technological optimists outnumber pessimists by two-to-one. Six in ten Americans (59%) feel that technological advancements will lead to a future in which people’s lives are mostly better, while 30% believe that life will be mostly worse.

Demographically, these technological optimists are more likely to be men than women, and more likely to be college graduates than to have not completed college. Indeed, men with a college degree have an especially sunny outlook: 79% of this group expects that technology will have a mostly positive impact on life in the future, while just 14% expects that impact to be mostly negative. Despite having much different rates of technology use and ownership, younger and older Americans are equally positive about the long-term impact of technological change on life in the future.

Source: U.S. Views of Technology and the Future (Smith 2014)
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### Activity: Explore a Community

**Language Spoken at Home**

**2012 American Community Survey 1-Year Estimates**

**Table View**

<table>
<thead>
<tr>
<th>Subject</th>
<th>United States</th>
<th>Los Angeles County, California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population 5 years and over</td>
<td>294,003,714</td>
<td>9,312,312</td>
</tr>
<tr>
<td><strong>Speak only English</strong></td>
<td>79.0%</td>
<td>42.8%</td>
</tr>
<tr>
<td><strong>Speak a language other than English</strong></td>
<td>21.0%</td>
<td>57.2%</td>
</tr>
<tr>
<td>Spanish or Spanish Creole</td>
<td>13.0%</td>
<td>39.5%</td>
</tr>
<tr>
<td>Other Indo-European languages</td>
<td>3.8%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Asian and Pacific Island languages</td>
<td>3.3%</td>
<td>10.9%</td>
</tr>
<tr>
<td>Other languages</td>
<td>0.9%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, 2012 American Community Survey

Source: [http://factfinder.census.gov/](http://factfinder.census.gov/)
Activity: Explore a Community

Source: Social Explorer Database
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</table>
Activity: Investigate Relationships

Source: http://gapminder.org
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</tr>
</tbody>
</table>
Activity: Analyze a Dataset

National Survey on Drug Use and Health, 2012 (ICPSR 34933)

Alternate Title: NSDUH 2012

Principal Investigator(s): United States Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality

Summary:
The National Survey on Drug Use and Health (NSDUH) series (formerly titled National Household Survey on Drug Abuse) primarily measures the prevalence and correlates of drug use in the United States. The surveys are designed to provide quarterly, as well as annual, estimates. Information is provided on the use of illicit drugs, alcohol, and tobacco among members of United States households aged 12 and older. Questions included age at first use as well as lifetime, annual, and past-month usage for... (more info)

Series: National Survey on Drug Use and Health (NSDUH) Series

Access Notes

* These data are freely available.

Dataset(s)

WARNING: This study is over 150MB in size and may take several minutes to download on a typical Internet connection.

National Survey on Drug Use and Health, 2012 - Download All Files (2,133.6 MB) large dataset

Documentation: Codebook.pdf, Questionnaire.pdf (screener), Questionnaire.pdf (showcards), Questionnaire.pdf (specs)

Data: SAS, SPSS, Stata, R, ASCII, Delimited ASCII + SAS Setup, SPSS Setup, Stata Setup

Analyze Online: run simple crosstabs/frequency, online analysis with SDA

Quick Tables: Drug Use: 12-17 year olds, Drug Use: Entire Sample

Source: http://icpsr.umich.edu
Resources: Teaching Resources

Source: http://teachingwithdata.org
Resources: Educational Journals
Resources: Training

[Image of a Lynda.com course on Excel 2013 Essential Training]

Source: http://itservices.usc.edu/lynda/
Keeping Current @ the USC Libraries
Teaching with Data: Resources and Strategies for Faculty Teaching Undergraduates

Katherine Guevara & Robert Sweeney
USC Center for Excellence in Teaching
CET Instructional Design Services

Program-level implementation
Alignment
Technology integration
Tool selection
Rubrics
Assessments
Active learning
Activities
Assignments
Syllabus
Course objectives

USC Center for Excellence in Teaching
Design Process for Data-Driven Assignments

1. Identify course objective assignment measures
2. Define assignment with description/prompt
3. Determine points/value of assignment in syllabus
4. Create grading rubric to score assignment
5. Plan scaffolding activities (within and leading to assignment)
6. Curate/create materials (data sets, links, samples/models)
7. Implement assignment
8. Debrief assignment with self and students
9. Plan changes to assignment based on debrief
10. Implement assignment again next semester
Essential Elements for Data-Driven Assignments

1. Finding data sources/sets
2. Reading and interpreting data
3. Analyzing data
4. Visualizing and representing data
5. Communicating data
Patterns in Faculty Support for Data-Driven Assignment Development

- Chunking assignment description
- Scaffolding activities that support skills required for assignment
- Creating assessment rubric
- Calibrating rubric
- Flipping resources/active learning
Sample: Scaffolding

JOUR 477: Web Analytics for News and Nonprofit Organizations
Dana Chinn, USC Annenberg School of Journalism

- Assignment 1: Introduction to basic Google Analytics metrics; what they are and how they are counted
- Assignment 2: Introduction to basic Excel calculations and formats
- Assignment 3: Download raw data from Google Analytics, perform basic calculations on the data in Excel, and create simple charts
- Assignment 4: Retrieve traffic source data from Google Analytics, analyze using Excel charts and tables, make recommendations based on analysis
- Assignment 5: Analyze Google Analytics keyword data in Excel, including new calculations and a pivot table, produce a Word document with extended analysis
### Sample: Rubric

#### POSC 437: Mass Media and Politics

Ann Crigler, Professor Chair, Political Science

<table>
<thead>
<tr>
<th>Organization</th>
<th>Below Expectations 5 pts</th>
<th>Approaches Expectations 10 pts</th>
<th>Meets Expectations 15 pts</th>
<th>Exceeds Expectations 20 pts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class cannot understand presentation because there is no sequence of information.</td>
<td>Class has difficulty following presentation because students jump around.</td>
<td>Students presented information in logical sequence which class could follow.</td>
<td>Students presented information in logical, interesting sequence which class could follow.</td>
</tr>
<tr>
<td>Subject Knowledge</td>
<td>Students do not have a grasp of information; students could not answer questions about subject.</td>
<td>Students were uncomfortable with information and were able to answer only rudimentary questions.</td>
<td>Students were at ease with expected answers to all questions, but failed to elaborate.</td>
<td>Students demonstrated full knowledge (more than required) by answering all class questions with explanations and elaboration.</td>
</tr>
<tr>
<td>Coverage of Topic</td>
<td>Students did not discuss all readings nor engage syllabus questions</td>
<td>Students discussed assigned readings and engaged syllabus questions in basic way</td>
<td>Students discussed more than assigned readings and engaged syllabus and additional questions somewhat</td>
<td>Students creatively and critically reviewed and discussed more than required readings, engaged with add l thought provoking questions or exercise</td>
</tr>
<tr>
<td>Graphics/Examples (g/e)</td>
<td>Students used superfluous graphics/examples or no g/e</td>
<td>Students occasionally used g/e that rarely supported points of presentation.</td>
<td>Students’ g/e related to points of presentation.</td>
<td>Students’ g/e explained and reinforced points of presentation.</td>
</tr>
<tr>
<td>Presentation</td>
<td>Group/individual seemed unprepared and were not engaging with the audience. Duties unclear or missing &amp; transitions are rough.</td>
<td>Group/individual was better prepared but still not engaged. Unequal duties and rough transitions among team members.</td>
<td>Group/individual was somewhat prepared and fairly engaging. Somewhat unequal duties and okay transitions.</td>
<td>Group/individual was well prepared and very engaging with the audience. Equal duties &amp; seamless transitions among team members.</td>
</tr>
</tbody>
</table>

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USC Center for Excellence in Teaching
Sample: Flipping

PPD 373: Public Policy and Planning Analysis
Jennifer Miller, Assistant Professor (Teaching), Price School of Public Policy

<table>
<thead>
<tr>
<th>lynda module</th>
<th>number</th>
<th>time</th>
<th>question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction/Welcome</td>
<td>0.1</td>
<td>0:00:43</td>
<td>Which version of the lynda.com tutorial will you be completing?</td>
</tr>
<tr>
<td>Introduction/ Using the Exercise files</td>
<td>0.2</td>
<td>0:00:23</td>
<td>How do you access the Exercise files for the lynda com tutorial?</td>
</tr>
<tr>
<td>What is Excel used for?</td>
<td>1.1</td>
<td>0:01:49</td>
<td>Excel is a giant _____ of _____ and ______. (Type the exercise number)</td>
</tr>
<tr>
<td>Using the menu system</td>
<td>1.2</td>
<td>0:04:30</td>
<td>Which of the following is not a tab on Excel's menu ribbon?</td>
</tr>
<tr>
<td>The structure of a worksheet or workbook</td>
<td>1.4</td>
<td>0:03:41</td>
<td>How are the terms row and column used in Excel? Rows are number</td>
</tr>
<tr>
<td>Using the formula bar</td>
<td>1.5</td>
<td>0:01:43</td>
<td>What does the formula bar allow you to see?</td>
</tr>
<tr>
<td>Shortcut menus and the Mini Toolbar</td>
<td>1.8</td>
<td>0:03:24</td>
<td>Which of the following options is on the shortcut menu that applies?</td>
</tr>
</tbody>
</table>
Teaching with Data: Organic Search Keyword Analysis

Resources & Strategies for Faculty Teaching Undergraduates

Faculty Author: Dana Chinn
Course: JOUR 477 Web Analytics for News and Nonprofit Organizations
Department or School: Annenberg Norman Lear Center Media Impact Project
Student Population: graduates and undergraduates, mostly seniors
Duration: 2 weeks
Deliverables:
- Final write-up of findings
- Excel workbook with sorted groups of branded and unbranded keywords and pivot table
Keywords: website traffic, search engines, keyword data, marketing strategy, aggregate percentages, pivot tables, Google Analytics
Summary: Students work individually and in groups, during and out of class, to choose a website of a news or nonprofit organization, download 500 organic search keywords from Google Analytics into Excel, code each keyword as branded or unbranded, use a pivot table to calculate the number and percent of sessions from branded vs. unbranded keywords, check and revise coding, recalculate totals and percentages, analyze the data, complete a table of summary metrics, and present findings in written form.
Assignment Goals: Knowing which keywords people use to get to a site gives invaluable, specific indicators of what people seek and how they perceive an organization. In this assignment you will download the top 500 organic search keywords, classify each as branded vs. unbranded, and use metrics such as bounce rate, the percent of new users and the pages per session to inform your recommendation on how an organization can attract and engage its target audiences.

Motivating Students

“I think the data-driven [assignment helps] you engage with the class material in a much more hands on manner as opposed to simply reading course material and discussing it. The data research project helped my understanding of the material presented by the various voices/readings as well as the professor.” -Student

“Intimidated but also felt like they really did something significant.” -Faculty
Motivating Students

1. Prepare your students by integrating data-based readings or case studies into the course prior to the assignment.
<table>
<thead>
<tr>
<th>Country</th>
<th>GNP per capita (US$)</th>
<th>HDI value</th>
<th>HDI rank</th>
<th>Life expectancy (years)</th>
<th>Adult literacy (%)</th>
<th>Infant mortality (per 1,000 live births)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>500</td>
<td>0.665</td>
<td>90</td>
<td>71.2</td>
<td>89</td>
<td>24</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>400</td>
<td>0.583</td>
<td>106</td>
<td>65.4</td>
<td>78</td>
<td>53</td>
</tr>
<tr>
<td>Pakistan</td>
<td>400</td>
<td>0.393</td>
<td>132</td>
<td>58.3</td>
<td>36</td>
<td>99</td>
</tr>
<tr>
<td>Guinea</td>
<td>500</td>
<td>0.191</td>
<td>173</td>
<td>43.9</td>
<td>27</td>
<td>135</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1,010</td>
<td>0.718</td>
<td>74</td>
<td>66.2</td>
<td>87</td>
<td>58</td>
</tr>
<tr>
<td>Jordan</td>
<td>1,060</td>
<td>0.628</td>
<td>98</td>
<td>67.3</td>
<td>82</td>
<td>37</td>
</tr>
<tr>
<td>El Salvador</td>
<td>1,090</td>
<td>0.543</td>
<td>112</td>
<td>65.2</td>
<td>75</td>
<td>46</td>
</tr>
<tr>
<td>Congo</td>
<td>1,040</td>
<td>0.461</td>
<td>123</td>
<td>51.7</td>
<td>59</td>
<td>83</td>
</tr>
<tr>
<td>Chile</td>
<td>2,360</td>
<td>0.848</td>
<td>38</td>
<td>71.9</td>
<td>94</td>
<td>17</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2,520</td>
<td>0.794</td>
<td>57</td>
<td>70.4</td>
<td>80</td>
<td>14</td>
</tr>
<tr>
<td>South Africa</td>
<td>2,540</td>
<td>0.650</td>
<td>93</td>
<td>62.2</td>
<td>80</td>
<td>53</td>
</tr>
<tr>
<td>Iraq</td>
<td>2,550</td>
<td>0.614</td>
<td>100</td>
<td>65.7</td>
<td>63</td>
<td>59</td>
</tr>
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Motivating Students

1. Prepare your students
2. Incorporate reflection into assignments
Motivating Students

1. Prepare your students
2. Incorporate reflection
3. Emphasize marketable skills and set aside class time for students to add these skills to resumes
Motivating Students

1. Prepare your students
2. Incorporate reflection
3. Emphasize marketable skills
4. Other suggestions?
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Resource Guide & CET Assignment Repository

http://libguides.usc.edu/teachingwithdata

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