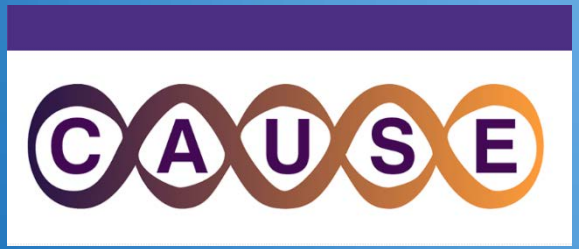
Teaching Statistics: Intuitive, Visual and Fun with JMP

Ruth Hummel, JMP Academic Ambassador



Consortium for the Advancement of Undergraduate Statistics Education

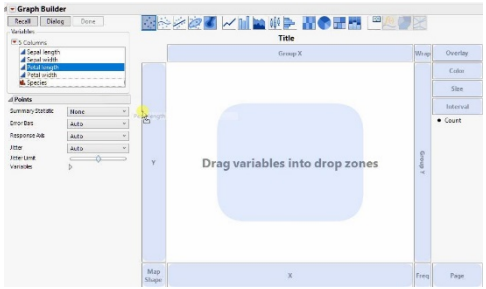
jmp® Statistical Discovery™ From SAS.

1. Explore some of the **visual and interactive features** that make teaching and learning in JMP engaging

2. Identify free and low-cost options to get **access to JMP** for the classroom

visual and interactive features in JMP

- Dynamic Linking of data
- Data Filtering
- Drag-and-Drop Graph Builder
- Profiler
- Built-in Concept Applets



- Easy transition to data science
  - 3-clicks to a Validation column
  - Visual emphasis for partitioning (CART)
  - Profiler to understand model

How to Get JMP

With affordable licensing options to fit every situation, it's easy to get academic access to JMP.

https://www.jmp.com/en_us/academic/academic-licensing.html

- The JMP Academic Suite: site license with access to JMP and JMP Pro for an unlimited number of academic users (including home use and virtualization)– check your University Software webpage for access or email **academic@jmp.com**
- 6- or 12-month student licenses of JMP for classroom use: **onthehub.com/jmp**
- JMP Student Edition bundled for free with many Introductory textbooks or available for a 3 year license at **jmp.com/getse**

A few resources:

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Randomization Testing in JMP® Pro

PRO This page provides information on randomization testing, which is a re-sampling approach to significance testing. Randomization testing is also known as Permutation testing. Randomization Testing is available from all JMP® Pro analysis reports.

Randomization Testing in JMP Pro

Here, we describe how to conduct a randomization test for two means using Fit Y by X.

1. From an open JMP data table, right-click on the column header for the Nominal X variable (in this example, sex) and select **New Formula Column > Random > Sample With Replacement**.

   This creates a new formula column, Resample[sex].

2. Conduct a 2-Sample t-Test.

   For this example, the **Y, Response** is Weight and the **X, Factor** is sex. See the page Two Sample t-Tests and CIs for information on how to conduct this test and interpret results.

3. In the analysis report window, **right-click** over the statistic of interest and select **Simulate**. Here we right-click on the column of output containing the Difference (between means).

4. In the Simulation window, select the column to switch out (sex) and the column to switch in (Resample[sex]), enter the desired number of samples (1000, in this example), and the random seed (if desired), and click **OK**.

   JMP re-runs the analysis for each sample. For each iteration, the values of the X, Factor (sex) are resampled with replacement.

   The results are stored in a data table with statistics for the original sample and each of t
   SimID▸ column identifies the resample number.

5. Use the **Distribution** platform to explore the results for the statistics of interest. Confid
   original estimate (the Difference, in this example) are provided, along with empirical (o

Interpretation: The empirical p-value for the two-tailed test is 0.3530. That is, 35.3% o
resampled differences were as extreme or more extreme than the difference we actual

Notes: The **Randomization Testing Add-in** on the JMP User Community (community.jmp.co
interactive randomization testing for common hypothesis tests in JMP. For more details on
Pro, search for **Simulate** in the JMP Help or in the book ***Basic Analysis*** (under **Help > Books**

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Box Plots

Use to display the distribution of continuous variables. They are also useful for comparing distributions.

Box Plots – One Variable

1. From an open JMP® data table, select **Analyze > Distribution**.
2. Click on one or more continuous variables from **Select Columns**, and Click **Y, Columns** (continuous variables have blue triangles).
3. Click **OK**. An outlier box plot is displayed by default next to the histogram (or above if horizontal layout). To display a quantile box plot, select the option from the **red triangle** for the variable.

Companies.jmp (Help > Sample Data Library)

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Quantile Box Plot

Outlier Box Plot

The lines on the Quantile Box Plot correspond to the quantiles in the distribution output.

Quantiles		
100.0%	maximum	66530.1
99.5%		66530.1
97.5%		66530.1
90.0%		36859.4
75.0%	quartile	20481.3
50.0%	median	9975.31
25.0%	quartile	5421.51
10.0%		-8428.6
2.5%		-37800
0.5%		-37800
0.0%	minimum	-37800

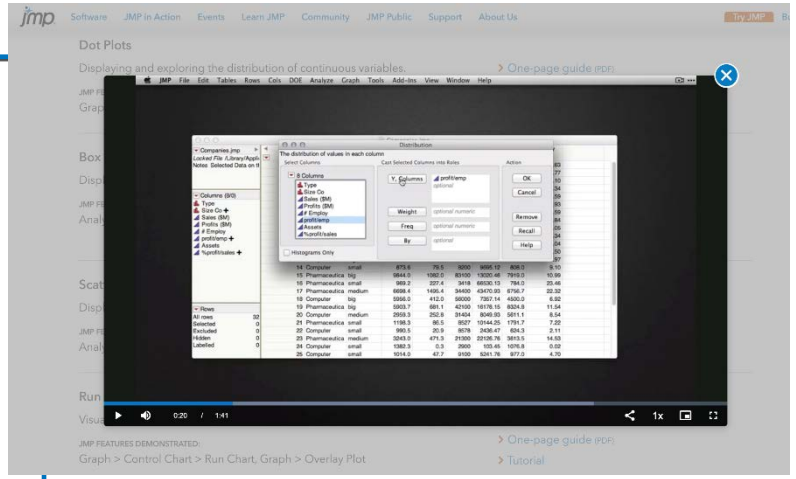
The Outlier Box Plot shows the box, plus:

- IQR = the 3rd quartile minus the 1st quartile
- Whiskers drawn to the furthest point within 1.5 x IQR from the box.
- Potential outliers (disconnected points).

Box Plots – Two Variables

1. Select **Analyze > Fit Y by X**.
2. Click on a continuous variable from **Select Columns**, and Click **Y, Response**.
3. Click on a categorical variable and click **X, Factor** (categorical variables have red or green bars).
4. Click **OK**. The Oneway Analysis output window will display.
5. Click on the **red triangle**, and select **Display Options > Box Plots** to display quantile box plots, or select **Quantiles** to display both box plots and quantiles (shown right).

Notes: Box plots for one or more variables can also be generated from **Graph > Graph Builder**. For more information on box plots, see the book ***Using JMP Student Edition*** (under **Help > Books**).



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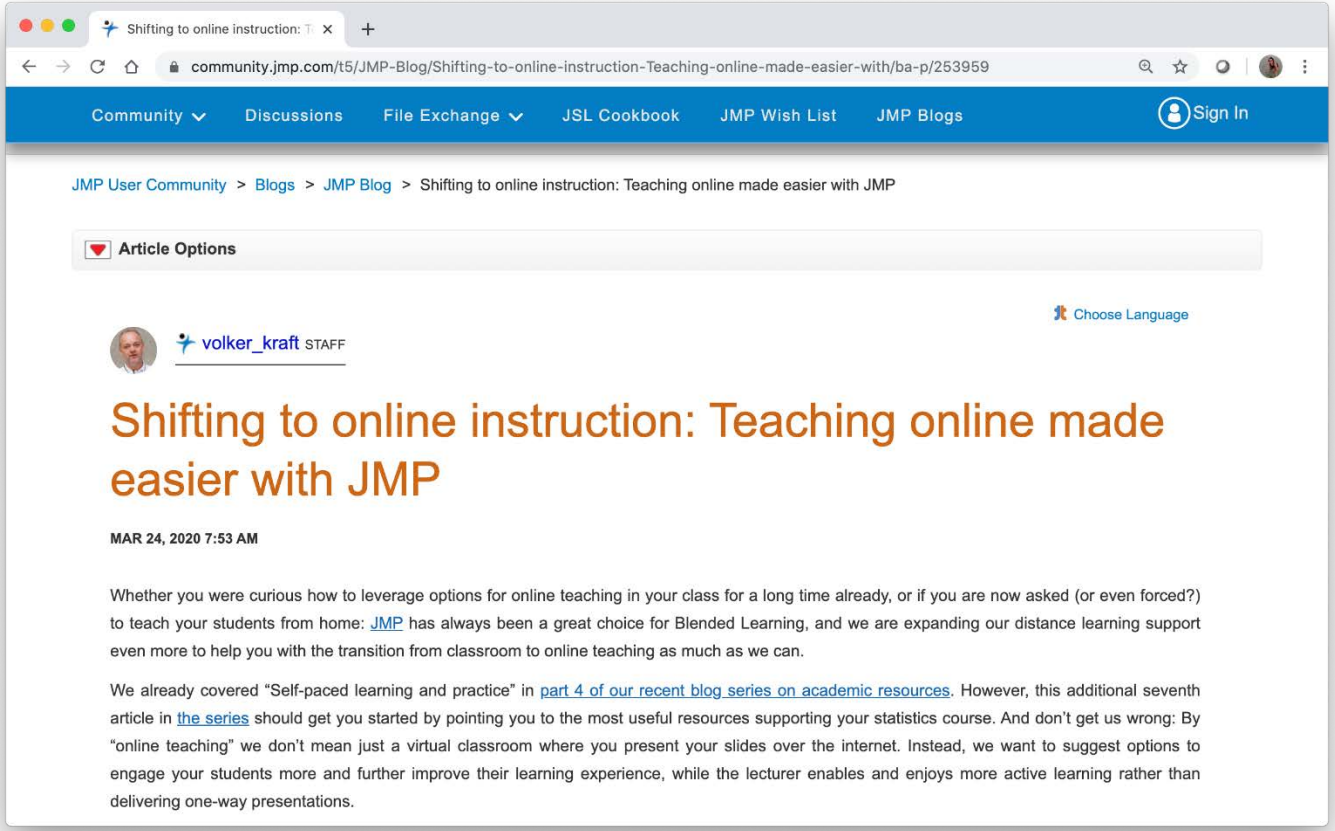
https://community.jmp.com/t5/JMP-Blog/Shifting-to-online-instruction-Teaching-online-made-easier-with/ba-p/253959



https://community.jmp.com/t5/JMP-Blog/The-bread-and-butter-when-teaching-with-JMP-Introduction-to/ba-p/239124

Questions?

academic@jmp.com

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