GAISEing into the NEW Guidelines

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GAISEing into the NEW Guidelines

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GAISEing into the NEW Guidelines

http://www.amstat.org/education/gaise/

- Original Report
- March Webinar Recording
- Completed Report
<table>
<thead>
<tr>
<th>Main Report: 25 pages</th>
<th>Supporting Appendices: 38 pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning Environments</td>
<td>Real Data</td>
</tr>
<tr>
<td>Examples of Assessment Items</td>
<td>Example of Using Technology</td>
</tr>
<tr>
<td>Examples of Using Technology</td>
<td>Examples of Assessment Items</td>
</tr>
<tr>
<td>Multivariable Thinking</td>
<td>Examples of Using Technology</td>
</tr>
<tr>
<td>Evolution of Intro Stats &amp; Emergence</td>
<td>Examples of Using Technology</td>
</tr>
<tr>
<td>Supporting Appendices: 113 pages</td>
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<table>
<thead>
<tr>
<th>Six Recommendations for Teaching</th>
<th>Five groups of Goals for Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Report: 26 pages</td>
<td>Main Report: 25 pages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>139 pages</th>
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</thead>
</table>

| Original GAISE College Report | 61 pages |

But everything has changed!

Everything is the same....
Two new emphases

a. **Teach statistics as an investigative process of problem-solving and decision-making.**
   
   Statistics is a problem-solving and decision-making process, not a collection of formulas and methods.

b. **Give students experience with multivariable thinking.**
   
   The world is a tangle of complex problems with inter-related factors. Let’s show students how to explore relationships among many variables.
What is your comfort level with multivariable thinking?

a) Very comfortable – Ready to teach it today!

b) Somewhat comfortable – Considering adding it as a new topic soon.

c) Not comfortable – Not Ready to Teach it Yet
Your assignment!

- As we go through the next example, think about how this activity can be used in different learning environments.
  - Face to Face
  - Distance Learning (Online)
  - Flipped (Inverted)
  - Large Classes
  - Cooperative Learning

- If you think of something, go ahead and send it as a chat message.

• Touches on 5 of the 6 recommendations (no Assessment today!)
• Statistical thinking experience
• Key **concept** in the lesson: Confounding/ lurking variable
  • *Limits of observational studies*
  • *Multivariable thinking via stratification*
• **Real data** relevant to student experience – engagement
• Interactive discussion – active learning
• Technology to convey the concept
What impact might we expect salaries to have on SAT scores?
What’s next?

- So, we have now set the stage for our investigation.

- We are now going to go through how to do work this out using four different technology packages.
  - R
  - JMP
  - Minitab Express
  - Excel
R commands to make a first scatterplot with fitted line.

```r
> plot(Mean.Total~Est.Mean.Salary, data=Guber, pch=16, ylab="State average SAT score", xlab="Average teacher salary")
> mod1=lm(Mean.Total~Est.Mean.Salary, data=Guber)
> summary(mod1)
> abline(mod1)
```
WHAT THE HECK

AM I LOOKING AT ???
R commands for the breakdown by Level

> #Using mosaic and lattice
> library(mosaic)
> mPlot(Guber) #then choose Selection: 2
> #then choose x and y, then color by Level, then choose Model as linear, then add a Key to the top
> #Here is what Show Expression gives:
> xyplot( Mean.Total ~ Est.Mean.Salary, data=Guber,
groups=Level, main="", type=c("p","r"),
auto.key=list(space="top", columns=3))
An R screenshot, using the mosaic package and mPlot()
### JMP Video

![JMP Interface](image)

<table>
<thead>
<tr>
<th>State</th>
<th>Expend per pupil</th>
<th>Avg PT Ratio</th>
<th>Est Mean Salary</th>
<th>%taking SAT</th>
<th>Level Taking</th>
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</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>4.405</td>
<td>17.2</td>
<td>31.144</td>
<td>8</td>
<td>low</td>
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<tr>
<td>Alaska</td>
<td>8.963</td>
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<td>47.951</td>
<td>47</td>
<td>middle</td>
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<tr>
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<td>32.291</td>
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<tr>
<td>Hawaii</td>
<td>6.078</td>
<td>17.9</td>
<td>38.518</td>
<td>57</td>
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<tr>
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<td>29.783</td>
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<tr>
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<td>26.461</td>
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</table>
JMP: Graph Builder
Minitab Express - Video
Excel (data grouping)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Per Pupil $</td>
<td>Pupil/Teacher</td>
<td>Salary</td>
<td>% eligible</td>
<td>Group</td>
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<tr>
<td>2 Alabama</td>
<td>4.405</td>
<td>17.2</td>
<td>31.144</td>
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</tr>
<tr>
<td>3 Alaska</td>
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<td>17.6</td>
<td>47.951</td>
<td>47</td>
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</tr>
</tbody>
</table>

=IF(E2<22,"low",IF(E2>49,"high","medium"))
Excel (side-by-side display)
Excel (all-in-one display)
Let’s Discuss

• So, how can we use this same example in different learning environments?
  – Face to Face
  – Distance Learning (Online)
  – Flipped (Inverted)
  – Large Classes
  – Cooperative Learning

• Please enter your thoughts into the chat room.
Interested in Learning More about GAISE 2016

• Watch the ASA webinar from March

• To read the current draft
  – http://www.amstat.org/education/gaise/

• Any questions or comments, please feel free to contact the co-chairs, Michelle Everson (everson.50@osu.edu) or Megan Mocko (mmeece@ufl.edu)