Analysis of Multiple Years of NSSE Data: Tips and Strategies

**Overview**

- Introduction
- Multi-Year NSSE Data Considerations
- Working with Multi-Year NSSE Data
- Analytical Models
- Visual Displays
- Wrap-up and Questions

**Multi-Year NSSE Participation**

<table>
<thead>
<tr>
<th>Total Years of NSSE Participation (2000-2007)</th>
<th>Number of Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>309*</td>
</tr>
<tr>
<td>2 years</td>
<td>260</td>
</tr>
<tr>
<td>3 years</td>
<td>218</td>
</tr>
<tr>
<td>4 years</td>
<td>160</td>
</tr>
<tr>
<td>5 years</td>
<td>96</td>
</tr>
<tr>
<td>6 years</td>
<td>65</td>
</tr>
<tr>
<td>7 years</td>
<td>46</td>
</tr>
<tr>
<td>8 years</td>
<td>31</td>
</tr>
</tbody>
</table>

* 108 first participated in 2007

**Guiding question**

How do we assess and interpret changes in our engagement scores over time?

**Pop Quiz**

3. Find x.

Here it is

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Indiana AIR March 2007 - Chen, Gonyea, Korkmaz, & Sarraf
Analysis of Multiple Years of NSSE Data: Tips and Strategies

### Multi-Year NSSE Data Considerations
- Five General Considerations
  - “Example College”
- Data Quality Considerations
- Which Multi-Year Approaches are Recommended?

### General Considerations
1. Engagement scores are process measures.
2. Engagement scores depend on context.
3. Analysis requires a baseline (criterion- or norm-referenced?)
4. Are the measures the same?
5. Assume stability or change?

### Stability or Change?

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY</td>
<td>53.0</td>
<td>56.1</td>
<td>55.6</td>
<td>56.0</td>
<td>55.8</td>
<td></td>
</tr>
<tr>
<td>SR</td>
<td>59.3</td>
<td>58.7</td>
<td>57.4</td>
<td>60.5</td>
<td>60.2</td>
<td></td>
</tr>
</tbody>
</table>

### “Example” College
Goal in 2002 –
“To enhance student engagement across all five NSSE benchmarks over the next five years compared with similar Carnegie institutions as well as our own criterion-referenced measures.”

### “Example” College

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</tr>
</thead>
<tbody>
<tr>
<td>Level of Academic Challenge FY</td>
<td>53.0</td>
<td>56.1</td>
<td>55.6</td>
<td>56.0</td>
<td>55.8</td>
<td></td>
</tr>
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<td>58.7</td>
<td>57.4</td>
<td>60.5</td>
<td>60.2</td>
<td></td>
</tr>
<tr>
<td>Active and Collaborative Learning FY</td>
<td>46.4</td>
<td>47.2</td>
<td>47.6</td>
<td>50.9</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td>SR</td>
<td>54.2</td>
<td>53.4</td>
<td>54.8</td>
<td>59.9</td>
<td>60.9</td>
<td></td>
</tr>
</tbody>
</table>

How much do scores need to change in order for the change to be real?

<table>
<thead>
<tr>
<th></th>
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<td>54.8</td>
<td>59.9</td>
<td>60.9</td>
<td></td>
</tr>
</tbody>
</table>
Data Quality Considerations

- Errors associated with comparing estimates
- How good are those estimates?
- Raw difference scores - both measures contain error
- Response rate
- Sample size
  - Sampling Error (frequencies) (depends on sample and population sizes)
  - Standard Error (means) (depends on variance and sample size)

Sampling Error

Use when comparing frequencies.

<table>
<thead>
<tr>
<th>Year</th>
<th>Sampling Error</th>
<th>Lower Bound</th>
<th>Point Estimate</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>+/- 5%</td>
<td>45%</td>
<td>50%</td>
<td>55%</td>
</tr>
<tr>
<td>2006</td>
<td>+/- 7%</td>
<td>53%</td>
<td>60%</td>
<td>67%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Sampling Error</th>
<th>Lower Bound</th>
<th>Point Estimate</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>+22%</td>
<td>45%</td>
<td>50%</td>
<td>55%</td>
</tr>
<tr>
<td>2006</td>
<td>-2%</td>
<td>53%</td>
<td>60%</td>
<td>67%</td>
</tr>
</tbody>
</table>

Multi-Year Approaches

2003
FIRST-YEAR
SENIOR

2006
FIRST-YEAR
SENIOR

Cross-sectional comparison of different cohorts

Longitudinal tracking of same cohort (panel data)
### Multi-Year Approaches

**2003**
- FIRST-YEAR

**2006**
- FIRST-YEAR

Tracking results of peer comparisons

Institutional Peers

### NSSE Survey & Reporting Changes

**Tools to help with**:
- Tracking variable changes
- Merging datasets
- Using Benchmark variables

### Beware, Variables Change

- Which of the following have you done or do you plan to do before you graduate from your institution?

<table>
<thead>
<tr>
<th>2002</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Yes</td>
<td>1) Done</td>
</tr>
<tr>
<td>2) No</td>
<td>2) Plan to do</td>
</tr>
<tr>
<td>3) Undecided</td>
<td>3) Do not plan to do</td>
</tr>
<tr>
<td>4) Have not decided</td>
<td></td>
</tr>
</tbody>
</table>

### Tracking Variable Changes

- Excel-based tool
- What survey items are comparable?
  - 2005 versus 2006
- Changes captured
  - Question wording
  - Response set
  - Benchmark inclusion
- “Filter” on multiple fields

### Merging Datasets

- SPSS syntax and scripts provided
- Steps to take...
  - Identify comparable variables
  - Update syntax with variable list
  - Run script through GUI, then run syntax
Analysis of Multiple Years of NSSE Data: Tips and Strategies

### Using Benchmark Variables

<table>
<thead>
<tr>
<th>Year</th>
<th>Level of Academic Challenge</th>
<th>Active &amp; Collaborative Learning</th>
<th>Supportive Campus Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>ACo</td>
<td>ACL</td>
<td>SCB</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dataset Checking
- Despite available tools, check the data!
- Review missing values for each survey item
- Run cross tabulation between items and year

<table>
<thead>
<tr>
<th>Administration Year</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asked questions in class or contributed to class discussions</td>
<td>Never</td>
<td>2.3%</td>
<td>3.5%</td>
<td>2.9%</td>
<td>2.0%</td>
<td>4.4%</td>
</tr>
<tr>
<td></td>
<td>Sometimes</td>
<td>38.0%</td>
<td>42.1%</td>
<td>41.1%</td>
<td>35.2%</td>
<td>40.9%</td>
</tr>
<tr>
<td></td>
<td>Often</td>
<td>33.2%</td>
<td>33.2%</td>
<td>31.1%</td>
<td>32.3%</td>
<td>30.3%</td>
</tr>
<tr>
<td></td>
<td>Very often</td>
<td>26.7%</td>
<td>20.9%</td>
<td>24.9%</td>
<td>29.7%</td>
<td>29.1%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

### Models of Multi-Year Analyses
- Descriptive Statistics
- Quick Effect Size Analysis
- T-test
- Analysis of Covariance (ANCOVA)
- Multiple Regression
- Multi-Level Analyses

### Initial Analysis
- Descriptive Statistics
  - Identifying consistent trends
  - Identifying unusual trends
    - No significant testing involved
    - Compare the mean or median
    - SPSS line chart
    - Excel spreadsheets

### Identifying Trends
![Graph showing trends over years]  
Percent “Frequently” (often & very often)

### Quick Effect Size Analysis
- A quick way of making multiple year comparison
- A rough estimation
- Effect Size calculation

\[
ES = \frac{M_1 - M_2}{SD_{pooled}}
\]

\[
SD_{pooled} = \sqrt{\frac{SD_1^2 + SD_2^2}{2}}
\]
Analysis of Multiple Years of NSSE Data:
Tips and Strategies

**Differences between Two Years**
- Independent Sampled T-test
  - Significant Test
  - Effect Size

  T-TEST
  GROUPS = year(2004 2006)
  /MISSING = ANALYSIS
  /VARIABLES = ACa
  /CRITERIA = CI(.95) .

**Compare Multiple Years**
- ANCOVA
  - Benchmarks or individual items as dependent variables
  - Year as the independent variable
  - Student characteristics as covariance
- Multiple Regression
  - Benchmarks or individual items as dependent variables
  - Year and student characteristics as independent variables

**Multi-Level Analyses**
- Hierarchical Linear Modeling (HLM)
  - DV: Student-level benchmark scores
  - Level-1 IV: Student characteristics
  - Level-2 IV: School-wise characteristics and year

**One Item**

**One Item by Groups**

**Two Items by Groups**
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Stacked Bar Chart

Bar Chart with Groups

Box and Whisker Charts

Box & Whisker Charts

Questions & Discussion

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