Analysis of Multiple Years of NSSE Data: Tips and Strategies

Overview

- Introduction
- Five Multi-Year Analysis “Tasks”
  1. Identifying Multi-Year Questions
  2. Methods for Multi-Year Analysis
  3. Data Quality
  4. Changes in NSSE Over Time
  5. Merging Multi-Year Data
- Multi-Year Results

Task 1: Identify and Focus on Specific Questions

Identifying Multi-Year Questions

Possible Multi-Year Questions

- Confirming stability and reliability
  - How stable was our data from one year to the next?
- Measuring change due to campus initiatives
  - Given the implementation of a specific campus initiative, how much did engagement change before and after?
- Identifying trends over time
  - What trends in the data are apparent in given engagement measures over time?

Identifying Multi-Year Questions

NSSEville State University – Research Question

- Previous NSSE results showed a deficit in undergraduate research, especially for women.
- Implemented “Undergraduate Student Research Program” (2006-07) to give resources to students and faculty for research projects outside of class.
- Question: Did research with faculty increase between 2006 and 2008? If so, did changes vary by gender?
Task 2: Select and Employ Appropriate Methods of Analysis

Important Considerations
- Engagement is a process measure, not an achievement measure.
- First and senior years are different educational contexts, with different engagement patterns.
- First-years include those who will leave your institution.
- Seniors include persisters as well as transfers.
- Attrition from survey participation.

Methods for Multi-Year Analysis

NSSE 2005
First-Year
Senior

NSSE 2008
First-Year
Senior

A: Cohort Comparisons
B: Longitudinal Comparison
C: Cross-sectional Comparisons

Methods for Multi-Year Analysis

NSSE 2005
First-Year
Senior

NSSE 2008
First-Year
Senior

A: ![](emoji)
B: 😞
C: 😞

Methods for Multi-Year Analysis

NSSE 2005
First-Year

NSSE 2008
First-Year

*Comparing the Comparisons

Comparison Group '05
Comparison Group '08

Methods for Multi-Year Analysis

Statistical Difference
- *t*-tests
**Methods for Multi-Year Analysis**

- **t-tests** determine whether the means of two groups are statistically different.
- **t-tests** can be quickly calculated by dividing the mean difference by the standard error of the mean.
- Standard errors of the mean are included in the comparison reports.
- t-scores greater than 2 are p<.05, greater than 2.6 are p<.01, and greater than 3.3 are p<.001.

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**t-test Calculation**

\[
\frac{M_{2008} - M_{2006}}{SEM} = t
\]

\[
\frac{64.8 - 60.4}{.89} = 4.9
\]

\(p<.001\)

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**Methods for Multi-Year Analysis**

- **Statistical Difference**
  - t-tests
  - ANOVA
    - Needs at least three years of data
  - Regression
    - Can use statistical controls
  - Practical Difference
    - Percentage change (frequencies)
    - Effect size (means)

---

**Effect Size Calculation**

\[
\frac{M_{2008} - M_{2006}}{SD_{pooled}} = d
\]

\[
\frac{64.8 - 60.4}{13.9} = .32
\]

\(\text{medium}\)

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**NSSEville State University - Methods**

<table>
<thead>
<tr>
<th>NSSE 2006</th>
<th>NSSE 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-Year</td>
<td>First-Year</td>
</tr>
<tr>
<td>Senior</td>
<td>Senior</td>
</tr>
</tbody>
</table>

- t-tests to determine statistical significance
- Effect size to determine practical significance
Task 3: 
Attend to Data Quality for Each Year in the Analysis

Data Quality
- Data quality measures to consider
  - Response rate
  - Sampling Error (frequencies) (depends on sample and population sizes)
  - Standard Error (means) (depends on variance and sample size)
  - Proportional representation
  - Missing data

Data Quality: Response Rate
- **Response rate**: Percentage of a sample that completes the questionnaire
- “Complete” → viewed the demographics page
- NSSE 2008 average response rate was 37%, with a large majority of institutions ranging from 20% to 60%
- Low response rates do not necessarily produce nonresponse bias
- Nonresponse bias is the extent to which responders and nonresponders differ on key variables
- Nonresponse bias is minimal in overall NSSE results

Data Quality: Sampling Error
- **Sampling error**: How much respondents could differ from the population
- Based on number of respondents (n) relative to total population (N)
- Preferred sampling errors around ± 3% or 5%
- Sampling errors greater than ± 10% need not be dismissed entirely, but should be interpreted with caution

Data Quality: Proportional Representation
- Determine the extent to which respondent demographics match those of your population
- Weighting may help counter bias
- NSSE weights data by gender and enrollment status (because women and full-time students respond at higher rates)

Data Quality
- Start with the **Respondent Characteristics** in your **Institutional Report**
- Response rates
- Sampling errors
- Student characteristics
- Check the **NSSE Multi-Year Reporting Logic Over Time** Handout
**NSSEville State University – Data Quality**

**2006**
- **Response Rate:** 32% (30% FY/34% SR)
- **Sampling Error:** 4.1% FY/4.4% SR
- **81% FY Female, 74% SR Female**

**2008**
- **Response Rate:** 35% (36% FY/34% SR)
- **Sampling Error:** 3.5% FY/3.5% SR
- **69% FY Female, 68% SR Female**

**Changes in NSSE Over Time**

- **Big changes in 2004!**
- **NSSE Multi-Year Variable Tracking Sheet**
  - Question changes
  - Response value changes
  - Benchmark considerations
- **See our new NSSE Multi-Year Data Analysis Guide** and our new Multi-Year Benchmark Report!

**Task 4:**
**Take into Account Changes in NSSE Items and Reports Across Years**

**Changes in NSSE Over Time**

- Use the **NSSE Multi-Year Variable Tracking Sheet Codebook Handout** to interpret the Excel spreadsheet [xls]
- Important variables to **always** consider:
  - **classran:** Institution reported class rank
    - (1 = First-Year, 4 = Senior)
  - **inelig:** Identifies eligibility (1 = Eligible)
  - **Sample type**
    - Smpl01 (2001-2003): 1 & 2 are random
    - Smpl05 (2004+): 1-3 are random
  - **Weight (stuwtx2 for 2001-2003, weight1 for 2004+)**
  - Any other controlling, independent, or dependent variables

**For my analyses, I want to “keep” the variables classran, inelig, smpl05, weight1, gender, and RESRCH04**
Task 5: Merge Multiple Years of Data

Merging Multi-Year Data with SPSS
- Save a copy of each year of your data with only the variables you want to “keep”
- In each year of your data create the same variable Year with a different value representing each year
  - 0 = 2001, 1 = 2004, 3 = 2007, 4 = 2008, etc.
- Open your “base year” and add the next year
  - Data -> Merge Files -> Add Cases
- Repeat for each additional year

Merging Multi-Year NSSEville State University Data

NSSEville Results

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2008</th>
<th>Percent Difference</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006 F-Y Male</td>
<td>69</td>
<td>4%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2006 F-Y Female</td>
<td>306</td>
<td>4%</td>
<td>YES**</td>
<td>.13 [small]</td>
</tr>
<tr>
<td>2008 F-Y Male</td>
<td>133</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008 F-Y Female</td>
<td>309</td>
<td>7%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2006 SR Male</td>
<td>83</td>
<td>21%</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>2008 SR Male</td>
<td>143</td>
<td>22%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006 SR Female</td>
<td>238</td>
<td>18%</td>
<td>YES***</td>
<td>.17 [small]</td>
</tr>
<tr>
<td>2008 SR Female</td>
<td>325</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent of Senior Students Doing Research with Faculty by Gender

Worked on a research project with a faculty member outside of course or program requirements
Multi-Year Results

Percentage of students that tutored or taught other students (paid or voluntary)

Percentage of excellent ratings of the quality of academic advising

Multi-Year Results

Number of written papers or reports of between 5 and 19 pages

Questions?

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