Analysis of Multiple Years of NSSE Data: Tips and Strategies

SAIR Conference
Dallas, Texas
October 17-20, 2009

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National Survey of Student Engagement
Introduction
Overview of Resources
Five Multi-Year Analysis “Tasks”
Displaying Multi-Year Results
Multi-Year Analysis Examples
Real Institutional Use of Multi-Year Analyses?
Who are you, and where are you from?

What is your experience with SPSS, Excel, and statistics?

What questions do you have right now?

What are you hoping to learn or take away from this workshop?

What is your institution’s history with NSSE?
Overview of Resources
Information for Researchers

NSSE is built on the foundation of past and current research on college student development and student learning, and we would like to continue our contributions toward the research in higher education. Here you will find the conceptual framework of NSSE, NSSE psychometric portfolio, NSSE SPSS syntax, and other NSSE research related information.

- Conceptual Framework
- NSSE Survey Instruments
- Psychometric Portfolio of NSSE
- Construction of NSSE Reports
- SPSS Syntax Library
- Conference Presentations and Research Papers
http://nsse.iub.edu/html/researchers.cfm

Variable Tracking Sheet [8]

NSSE Multi-Year Variable Tracking Sheet Codebook

<table>
<thead>
<tr>
<th>Column Heading Stem</th>
<th>Description (and value labels, if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SORT</td>
<td>Provides NSSE dataset variable order</td>
</tr>
<tr>
<td>N</td>
<td>Survey item number (variables absent from survey do not have a value)</td>
</tr>
<tr>
<td>Var</td>
<td>Variable name (“*” next to name indicates important variable)</td>
</tr>
<tr>
<td>Q</td>
<td>Variable description</td>
</tr>
<tr>
<td>Q comp</td>
<td>Variable compared with previous and following year</td>
</tr>
<tr>
<td>Value labels:</td>
<td></td>
</tr>
<tr>
<td>1 = exactly alike</td>
<td></td>
</tr>
<tr>
<td>2 = similar enough to merge years</td>
<td></td>
</tr>
<tr>
<td>3 = different (do not merge data)</td>
<td></td>
</tr>
<tr>
<td>4 = new variable</td>
<td></td>
</tr>
<tr>
<td>5 = variable discontinued</td>
<td></td>
</tr>
<tr>
<td>RV</td>
<td>Response values</td>
</tr>
<tr>
<td>RV comp</td>
<td>Response values compared with previous and following year</td>
</tr>
<tr>
<td>Value labels:</td>
<td></td>
</tr>
<tr>
<td>1 = exactly alike</td>
<td></td>
</tr>
<tr>
<td>2 = similar enough to merge years</td>
<td></td>
</tr>
</tbody>
</table>
NSSE Multi-Year Data Analysis Guide

About this Guide

Questions from NSSE users about the best approach to using results from multiple administrations are increasingly common. More than three quarters of NSSE participating institutions have administered the survey

2. Select and employ appropriate methods of analysis. Determine your analytic approach and the statistical tests that would best identify changes from year-to-year, and the criteria that might be used for evaluating the magnitude of
Multi-Year Benchmark Reports (New in 2008) [10]
NSSE Multi-Year Reporting Logic Over Time (internal NSSE document) [7]

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Weighting</td>
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<td>None</td>
<td>stuwt2</td>
<td>stuwt2</td>
<td></td>
</tr>
<tr>
<td>Sample</td>
<td>School</td>
<td>1, 2, 3</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>(smpl01)$^1$</td>
<td>Reference</td>
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<td>1</td>
<td>1</td>
<td>1, 2</td>
</tr>
</tbody>
</table>

$^1$ smpl01 values of 1 and 2 are random; 3 is targeted

$^2$ Institution-level comparison (student-level benchmark scores not calculated: average item approach used)

$^3$ Institution-level comparison
NSSE staff are frequently asked to help interpret effect sizes. “Is .3 a small effect size?” “Is .5 a really large effect size?” An effect size (ES) is any measure of the strength of a relationship between two variables. In practice ES statistics are used to assess comparisons involving correlations, percentages, mean differences, probabilities, and so on. In cases where large sample sizes make it more likely that a difference – even a small one – will be statistically significant, ES statistics are often thought of as a measure of practical significance because they indicate the relative magnitude of the difference. Thus they are valuable in comparing abstract measurement indices such as the NSSE benchmarks which are computed on a 0 to 100 scale from sets of
National Survey of Student Engagement Measurement Scales, Component Items, and Intercorrelation Tables (NSSE 2009 Data)

<table>
<thead>
<tr>
<th>Scale</th>
<th>Variable</th>
<th>Description</th>
<th>Intercorrelation Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 reall</td>
<td>Number of assigned textbooks, books, or book-length packs of course readings</td>
<td></td>
<td>0.22 0.39 0.29 0.16 0.17 0.15 0.09 0.15 0.24 0.13</td>
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<tr>
<td>2 writemi</td>
<td>Number of written papers or reports of 20 pages or more</td>
<td></td>
<td>0.07 0.43 0.17 0.11 0.14 0.14 0.11 0.16 0.16 0.09</td>
</tr>
<tr>
<td>3 writemi</td>
<td>Number of written papers or reports between 5 and 19 pages</td>
<td></td>
<td>0.25 0.30 0.40 0.16 0.18 0.17 0.12 0.14 0.18 0.09</td>
</tr>
<tr>
<td>4 writemi</td>
<td>Number of written papers or reports of fewer than 5 pages</td>
<td></td>
<td>0.24 0.04 0.23 0.10 0.11 0.11 0.09 0.06 0.13 0.04</td>
</tr>
<tr>
<td>5 analyz</td>
<td>Analyzing the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components</td>
<td></td>
<td>0.15 0.04 0.15 0.12 0.62 0.30 0.52 0.27 0.18 0.24</td>
</tr>
<tr>
<td>6 synthez</td>
<td>Synthesizing and organizing ideas, information, or experiences into new, more complex interpretations and relationships</td>
<td></td>
<td>0.15 0.07 0.17 0.10 0.60 0.58 0.54 0.30 0.20 0.23</td>
</tr>
<tr>
<td>7 evaluat</td>
<td>Making judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions</td>
<td></td>
<td>0.13 0.07 0.15 0.09 0.48 0.36 0.53 0.28 0.14 0.20</td>
</tr>
</tbody>
</table>

Benchmarks of Effective Educational Practices
SPSS Merging Syntax [12]
Multi-Year Tracking Sheet Example [11]
Small Group Exercises [4]

All slides and handouts will be available online
Five Multi-Year Analysis “Tasks” [9]
1. Identify And Focus On Specific Questions
2. Select and Employ Appropriate Methods of Analysis
3. Attend to Data Quality for Each Year in the Analysis
4. Take into Account Changes in NSSE Items and Reports Across Years
5. Merge Multiple Years of Data
Task 1:
Identify and Focus on Specific Questions
Confirming stability and reliability

How stable was our data from one year to the next?

NSSEville State University has participated in NSSE every year since 2003. Although NSU’s response rates tend to hover around 30% for both first-years and seniors, the response rate for first-years in 2007 was only 12%. Can NSU trust their 2007 data?
Measuring change due to campus initiatives

Given the implementation of a specific campus initiative, how much did engagement change before and after?

NSSEville State University has decided to invest in various new technologies for the majority of their campus buildings. Just some of these technologies include student-response systems, smart boards, state-of-the-art computer labs, and a course management system with support for a variety of tools such as blogs, wiki’s, surveys, and video conferencing. How did engagement change before and after these investments?
Identifying trends over time

What trends in the data are apparent in given engagement measures over time?

NSSEville State University has participated in several years of NSSE but has yet to do any meaningful analysis with the data. Over the last few years, NSU has developed a reputation for providing a fun and friendly campus while maintaining rigorous academic standards. Are there trends in NSU’s data to support this?
Random exploration is tricky and tiresome!

Think of at least one research question that would be useful for your own campus


What item or items might you use? [2] Is there a scale or benchmark might you use? [3]

What students do you want to study? First-years and seniors as a whole? A certain subpopulation?
Measuring Change Due to Campus Initiative

NSSEville’s new Undergraduate Student Research Program gives resources to students and faculty for research projects outside of class.

Question: After the implementation of the undergraduate student research program in 2007, did research with faculty increase between 2006 and 2008? If so, did changes vary by gender?
Break

Small Group Exercise
Confirming stability and reliability

- How stable or reliable is data from one year to the next?
  - Can NSU trust their 2007 data?

Measuring change

- Given the implementation of a specific campus initiative, how much did engagement change before and after?
  - How did engagement change before and after these technological investments?

Identifying trends over time

- What trends in the data are apparent in given engagement measures over time?
  - Are there trends in NSU’s data to support their growing reputation?
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 those who persist as well as transfers

Don’t forget about survey participation attrition
Methods for Multi-Year Analysis

Statistical Difference

- *t*-tests
- ANOVA
  - Needs at least *three* years of data
  - Can use statistical controls
- Regression
  - Can use statistical controls

Practical Difference

- Effect Size
- Percentage Change
Methods for Multi-Year Analysis

Statistical Difference

$t$-tests can be quickly calculated by hand from information given in your NSSE reports.

\[
t = \frac{\text{MEAN}_A - \text{MEAN}_B}{\text{SEM}_A} = \frac{64.8 - 60.4}{.89} = 4.9
\]

$t$-scores greater than 2 are $p<.05$, greater than 2.6 are $p<.01$, and greater than 3.3 are $p<.001$. 
Practical Difference

An effect size can be calculated by dividing the mean difference by the pooled (average) standard deviation

\[ d = \frac{\text{MEAN}_A - \text{MEAN}_B}{SD_{\text{pooled}}} = \frac{64.8 - 60.4}{13.9} = .32 \]

Effect sizes are interpreted subjectively. NSSE uses the following for benchmark comparisons [5]

- \(|.1|\) is small
- \(|.3|\) is medium
- \(|.5|\) is large
- \(|.7|\) is very large
$t$-tests to determine statistical significance

Effect size to determine practical significance
Task 3:
Attend to Data Quality for Each Year in the Analysis
Response rate
Sampling Error (frequencies)
(depends on sample and population sizes)
Standard Error (means)
(depends on variance and sample size)
Proportional Representation
Missing data
Start with the *Respondent Characteristics* in your Institutional Report [6]

- Response rates
- Sampling error
- Student characteristics
Response rate: percentage of a sample that completes the survey

“Complete” for NSSE means the student viewed the demographic page

NSSE 2008 response rate was 37%, with a 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
Sampling error: how much respondents could differ from the population

- Based on the number of respondents (n) relative to the total population (N)
- Preferred sampling errors are around ±3% or 5%
- Sampling errors greater than ±10% need not be dismissed entirely, but should be interpreted with caution
Proportional representation: 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)
2008

- Response Rate: 35% (36% FY/34% SR)
- Sampling Error: 3.5% FY/3.5% SR
- 69% FY Female, 68% SR Female
Task 4:
Take into Account Changes in NSSE Items and Reports Across Years
Analyzing reports versus analyzing data—check the *NSSE Multi-Year Reporting Logic Over Time* handout [7]

Big changes in 2004!

*NSSE Multi-Year Variable Tracking Sheet* [8]
- Question changes
- Response value changes

Benchmark considerations
- See our *NSSE Multi-Year Data Analysis Guide* [9] and our *Multi-Year Benchmark Report* [10]
Use the *NSSE Multi-Year Variable Tracking Sheet Codebook* handout to interpret the Excel spreadsheet (.xls) [8]

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
- Any other controlling, independent, or dependent variables
For my analyses, I want to “keep” the variables classran, inelig, smpl05, weight1, gender, and RESRCH04 [11]
Break

Small Group Exercise
What type of question are you asking (stability, change, trends)?
What is your research question?
What items, scales, or benchmarks are you going to use?
What student characteristics do you want to study or control for?
What type of analysis are you going to perform (cohort, longitudinal, etc.)?
What statistical or practical analyses are you going to perform?
What data quality issues do you need to keep in mind?
What changes in NSSE do you need to be careful of?
What data are you going to merge?
Who is your audience?
How are you going to display or report your results?
Task 5: Combining NSSE and Additional Institutional Data
Account for any changes in variable names

Don’t forget to create a variable to account for the data’s year!

Merge options

SPSS pull-down menus

Data -> Merge Files -> Add Cases

Write your own syntax
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
See *Using SPSS to Merge Multiple Years of Data* handout [12]

After running this syntax, I now have an SPSS dataset called "NSSEville 2006 2008" with the six variables I wanted to use in my analyses and a new variable that identifies the year of the data.
Linking to Institutional Data: Rationale, Steps, Possible Linkages
NSSE instrument content limited in scope

Additional data sources can expand the types of analyses you can run

Institution records may be a more accurate source for some data (e.g. Test scores, class year)

NSSE allows you to create “group” variables in your population file process that can aid post hoc analyses
Maintain student “crosswalk” files
Develop appropriate population files
Document how population files are created
Familiarize yourself with your data file
Merge data file with other sources of data on your campus and nationally

- student educational outcomes
- other student characteristics
- other campus surveys
- other national surveys
Linking NSSE Data to Other Data Sources

**EDUCATIONAL OUTCOMES**
- GPA
- Retention/Graduation
- Progress to Degree

**OTHER CHARACTERISTICS**
- Program Participation
- Provisional Status
- Specific Degree Tracks

**OTHER SURVEYS**
- FSSE
- BCSSE
- Etc.

**INTERNAL SURVEYS**
- Grad Senior Survey
- Campus Experience Survey
- Dept-Specific Surveys
Open NSSE data file

Using your crosswalk file, merge in each student’s actual personal ID number *(if different from the unique identifier you provided to NSSE in your fall population file)*

Then merge in any other desired campus information sources by using the official student ID number as the key variable

What could we link???
Research Questions

1) Do students of diverse backgrounds (academic, racial/ethnic, parent education, etc.) report similar levels of academic effort?

2) Do students for whom institution was not first-choice show lower levels of engagement during first year?

3) Do recipients of elite merit scholarships engage more actively in enriching educational experiences?
Research Questions

1) Are elite academic scholarship winners engaged in more deep learning activities or research with faculty?

2) Do first generation students rate support of campus environment similar to their non-first-generation peers?

3) Do students from low socioeconomic backgrounds spend more time working for pay or providing care for dependents than their more affluent peers?
Research Questions

1) How does learning community or first-year seminar participation relate to ratings of the campus environment?

2) Do first year students who participate in college transition or summer academic enrichment programs engage in active and collaborative learning activities similar to their non-participant peers?
Research Questions

1) Do students who utilize campus writing centers report greater deep learning and/or general education gains?

2) Do students with learning or physical visibilities perceive the support available on campus in ways comparable to peers?

3) Do students admitted on academic probation receive feedback frequently? And or discuss grades and assignments with faculty on a regular basis?
Research Questions

1) Are student athletes less engaged than non-athletes in enriching educational experiences?
2) How does class preparation (coming to class prepared, rewriting papers, asking questions in class) of student athletes compare to that of non-athletes? For athletes in high profile versus lower profile sports?
3) How much reading and writing do student athletes report compared to non-athlete peers in general? And to those enrolled in same coursework?
Research Questions

1) Do students participating in honors programs engage in research with faculty or internship experiences at rates higher than students of lower academic ability?

2) Do students believe that their examinations have challenged them to do their best work? Does this rating vary across majors within a given class year?

3) How do students in various departments view the campus environment? (e.g., their ratings of relationships with peers, faculty, administrative personnel)
Research Questions

1) Are students who participate in cocurricular activities as engaged in active learning experiences?

2) How does amount of time spent preparing for class compare between students who are actively engaged in cocurriculars to that of less involved students?

3) Do students active in leadership roles in their cocurricular activities report gains that differ from less involved peers? (e.g. ability to work well with others, understanding people of other backgrounds, understanding self)
Displaying Multi-Year Results
Worked on a research project with a faculty member outside of course or program requirements

<table>
<thead>
<tr>
<th>Percent “done”</th>
<th>Statistical Difference?</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>5%</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>%</td>
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<td>.17 (small)</td>
</tr>
<tr>
<td>.%</td>
<td>YES***</td>
<td>.17 (small)</td>
</tr>
</tbody>
</table>
Percent of Senior Students Doing Research with Faculty by Gender

**2006**
- No research: 61%
- Male: 39%
- Female: 18%

**2008**
- No research: 53%
- Male: 47%
- Female: 25%
Multi-Year Results

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

- **2002**: [Bar heights for Very Often, Often, Sometimes, Never]
- **2004**: [Bar heights for Very Often, Often, Sometimes, Never]
- **2006**: [Bar heights for Very Often, Often, Sometimes, Never]
- **2008**: [Bar heights for Very Often, Often, Sometimes, Never]

Legend:
- Purple: Very Often
- Green: Often
- Red: Sometimes
- Blue: Never
Percentage of excellent ratings of the quality of academic advising
Number of written papers or reports between 5 and 19 pages*

*First-year respondents
Institutional Displays of Multi-Year Analyses
Office of Institutional Effectiveness

NSSE 2008
Student Engagement at Mercer

Mercer scored higher than its peer institutions on NSSE’s 5 benchmarks of effective educational practice:

1. Level of Academic Challenge
2. Active and Collaborative Learning
3. Student-Faculty Interaction
4. Enriching Educational Experiences
5. Supportive Campus Environment

This site contains information about Mercer’s scores on the NSSE benchmarks. The entire list of questions and Mercer’s scores are available at this address: [www.mercer.edu/oie/assessment/NSSE08.pdf](http://www.mercer.edu/oie/assessment/NSSE08.pdf)

The NSSE, administered annually to first year and senior students, assesses student involvement in the educational opportunities provided by colleges and universities nationwide.

The National Survey of Student Engagement project, supported by a grant from the PEW Charitable Trusts, was first conceived in 1998. Since its inception in 1999, over 1,100 different colleges and universities have participated in the project.
Welcome to Pace University's National Survey of Student Engagement (NSSE) Web page.

About Pace University
Pace University offers a comprehensive education combining exceptional academics, professional experience, and the New York advantage.

Originally founded in 1906, Pace is a leading, private metropolitan university with three campuses in downtown New York City, Westchester County, and White Plains, New York. Our diverse population of students is enrolled in more than 3,000 courses across more than 100 majors. Students take advantage of Pace’s college and five schools in the liberal arts and sciences, business, law, nursing, education, and computing. Pace’s prime locations put students just steps away from world-class centers of finance, accounting, media, healthcare, performing arts, and technology. The student experience is further enhanced by a robust cooperative and internship program that is one of the largest in the metropolitan area.

About NSSE at Pace University
2008 will represent the seventh administration of the NSSE in as many years.

Click for a summary of Pace University’s NSSE experience: (Word document).
Student Interactions with Faculty Members (SFI)—talking with faculty members and advisers, discussing ideas from classes with faculty members outside of class, getting prompt feedback on academic performance, and working with faculty members on research projects. Explore the following links for examples of student interactions with faculty members at Pace University:

- Eugene M. Lang Research Fellows
- CSIS Student/Faculty Research
- First Lego League
- Robotics Lab
- Pace Ad Teams
- Investment Research Challenge Teams
- Model UN
- Emil Froeschels Speech and Hearing Center
- Haskins Laboratories
- Center for Teaching, Learning and Technology

Read more stories:

- The Power of Tea: Schiffenbauer’s student research team finds white tea effective in fighting germs
- Fast Facts: 100 Opportunities of Service and Civic Engagement
- A Student/Teacher Interdisciplinary Fine Arts Collaboration: Public Mood Ring: Where Art Meets Technology
This side-by-side format could also be used for multiple years results. For example, where:

- **2006**
- **2008**

**NSSE Results: Website Examples**

**Level of Academic Challenge Benchmark Items**

- Number of assigned textbooks, books or book-length packs of course readings
- Number of written papers or reports of 20 pages or more
- Number of written papers or reports of between 5 and 19 pages
- Number of written papers or reports of fewer than 5 pages
- Coursework emphasizes: Analyzing the basic elements of an idea, experience or theory
- Coursework emphasizes: Synthesizing and organizing ideas, information or experiences into new, more complex interpretations and relationships
- Coursework emphasizes: Making judgments about the value of information, arguments or methods
We are looking for good ideas and examples of NSSE Multi-Year Analyses and Reporting? Can your campus help?
Questions & Discussion Time

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