

# Approaches to Longitudinal Analysis

NSSE Users Workshop  
Bucknell College  
April 2015

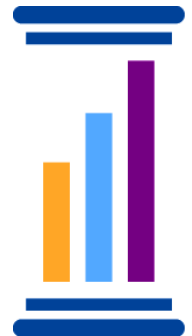


Allison BrckaLorenz

Louis Rocconi

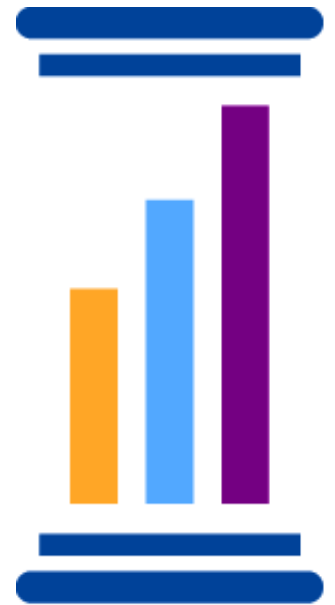
# Overview

- Introduction
- Five Multi-Year Analysis “Tasks”
  - Identifying Multi-Year Questions
  - Methods for Multi-Year Analysis
  - Data Quality
  - Changes in NSSE Over Time
  - Merging Multi-Year Data
- 2013 Survey Update Considerations
- Multi-Year Results Examples



Task 1:

# Identify and Focus on Specific Questions



# Identifying Multi-Year Questions

- Multi-year questions should be
  - *Specific*
  - *Answerable*
  - *Relevant to campus priorities*
- Exploratory studies are possible, but it is best to set limits to focus the effort

# 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?*

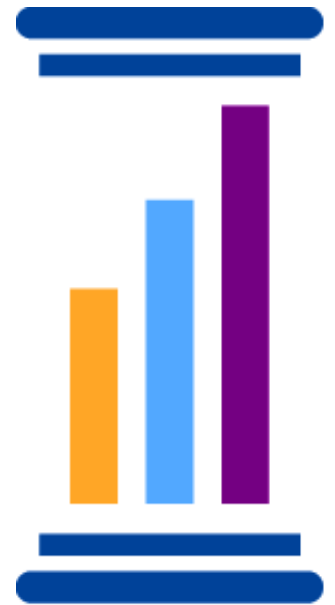
# NSSEville State University – Research Question

“Undergraduate Student Service-Learning Program” (2013-14) gives resources to students and faculty for service-learning projects.

- **Question: Did service-learning increase between 2013 and 2015? If so, did changes vary by sex?**

Task 2:

**Select and Employ  
Appropriate  
Methods of Analysis**



# Cohort Analyses

NSSE 2013

NSSE 2016

First-Year



First-Year

Senior



Senior

---

A:





# Longitudinal Comparisons

NSSE 2013

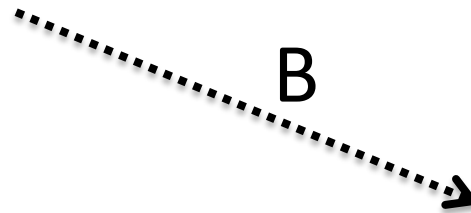
First-Year

Senior

NSSE 2016

First-Year

Senior



---

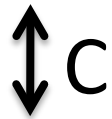
B:



# Cross-Sectional Comparisons

NSSE 2013

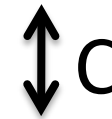
First-Year



Senior

NSSE 2016

First-Year



Senior

---

C:



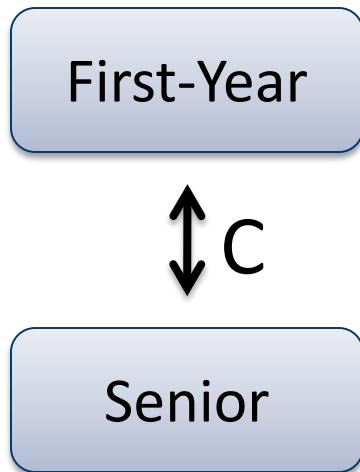
# Methods for Multi-Year Analysis

- **Important Considerations**

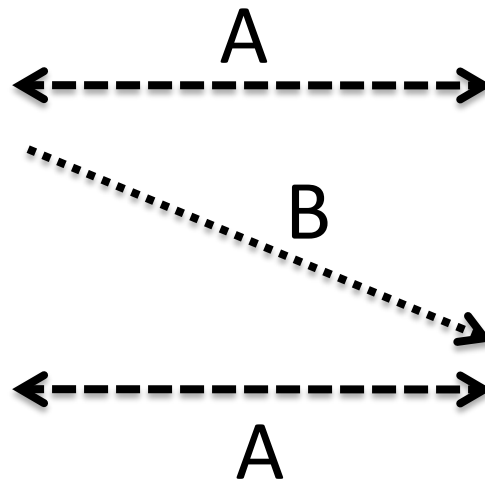
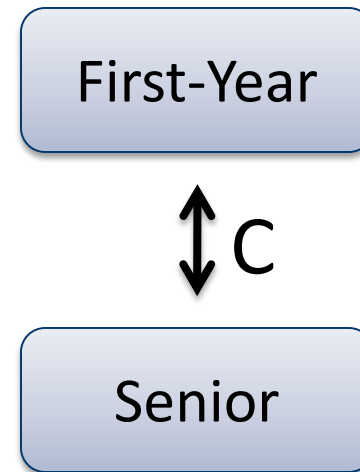
- Engagement is a process measure, not an achievement measure.
- First and senior years are different educational contexts, with different engagement patterns.
- First-years include those who will leave your institution.
- Seniors include persisters as well as transfers.
- Attrition from survey participation.

# Methods for Multi-Year Analysis

NSSE 2013



NSSE 2016



A:



B:



C:



# 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**

- Percentage change (frequencies)
- Effect size (means)



# NSSEville State University - Methods

NSSE 2013

First-Year

Senior

NSSE 2015

First-Year

Senior



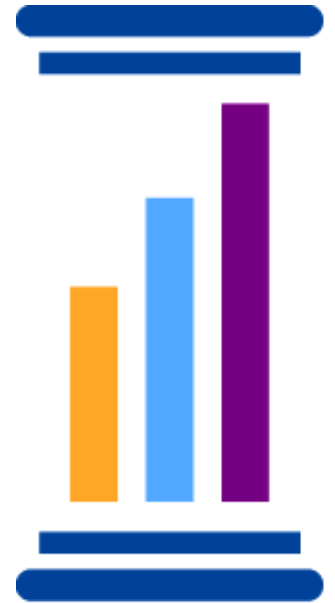
- $t$ -tests to determine statistical significance
- Effect size to determine practical significance

# Quick Stats Review

- $t$ -tests determine whether the means of two groups are statistically different
- Effect size: A measure of the strength of the relationship between two variables;  
*practical* significance
  - Cohen's  $d$  is a common measure of effect size
  - See *Contextualizing NSSE Effect Sizes*.  
For EIs, consider:
    - $> |.1|$  = small
    - $> |.3|$  = medium
    - $> |.5|$  = large

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 2014 average response rate was 32%, with more than half of institutions achieving 30% or higher
- 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 responses could differ from the population
  - Based on number of respondents ( $n$ ) relative to total population ( $N$ )
  - Preferred sampling errors around  $\pm 3\%$  or  $5\%$
  - Sampling errors greater than  $\pm 10\%$  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 sex and enrollment status (because females and full-time students respond at higher rates)

# Data Quality

- Start with the **Administration Summary** and **Respondent Characteristics** reports in your *Institutional Report*
  - Response rates
  - Sampling errors
  - Student characteristics

# NSSEville State University – Data Quality

## 2013

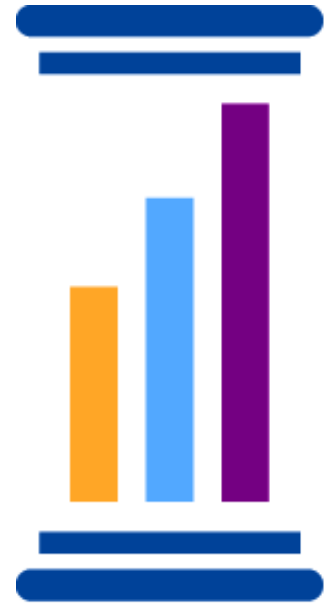
- Response Rate: 32%  
(30% FY/34% SR)
- Sampling Error:  
4.1% FY/4.4% SR
- 81% FY Female,
- 74% SR Female

## 2015

- 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



# Changes in NSSE Over Time

- Big changes in 2013!
- *NSSE Item and Variable Changes*
  - Question changes
  - Response value changes



## NSSE 2013 to 2014 Item and Variable Changes

View the codebooks at [nsse.iub.edu/html/data\\_codebooks.cfm](http://nsse.iub.edu/html/data_codebooks.cfm)

(August 2014)

| NSSE 2013 Items and Variables |  |   | NSSE 2014 Items and Variables |   |   | Comparisons  |
|-------------------------------|--|---|-------------------------------|---|---|--|
| Variable Name                 | Variable Label   | Response Options  | Variable Name                 | Variable Label  | Response Options  | 2013-2014  |
| tmread                        | Of the time you spend preparing for class in a typical 7-day week, about how many hours are on <i>assigned reading</i> ? | 1=0 Hours per week<br>2=1-5<br>3=6-10<br>4=11-15<br>5=16-20<br>6=21-25<br>7=26-30<br>8=More than 30 | reading                       | Of the time you spend preparing for class in a typical 7-day week, about how much is on <i>assigned reading</i> ?   | 1=Very little<br>2=Some<br>3=About half<br>4=Most<br>5=Almost all | Major change. Item was changed to reduce cognitive burden associated with an enumerated response, and to prevent inconsistencies with the total amount of reported class preparation time. |
| tmreadhrs                     | Estimated hours: <i>tmread</i> recoded by NSSE using response range midpoints.   |   | tmreadinghrs                  | Estimated number of hours on assigned reading calculated by NSSE, multiplying <i>tmprephrs</i> by a proportion of <i>reading</i> (Very little=.10; Some=.25; About half=.50; Most=.75; Almost all=.90). |   | Major change. New estimate based on a different formula and variables. Items not comparable.   |



# Changes in NSSE Over Time

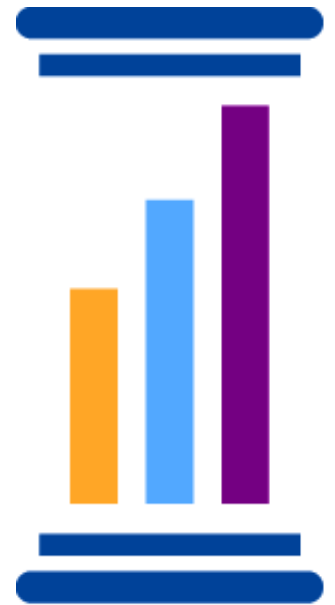
- Important variables to *always* consider:
  - **IRclass**: Institution reported class rank (1 = First-Year, 4 = Senior)
  - **eligible**: Identifies eligibility
  - **sample**
    - 1 thru 3 (census, random sample, random oversample)
    - 4 (targeted oversample), 5 (local), 6 (experiment)
  - **weight1** (used in NSSE reports) and **weight2** (weights up to population numbers)
  - Any other controlling, independent, or dependent variables

# Changes in NSSE Over Time

- NSSEville will use
  - **IRclass**: first-year and senior
  - **eligible**: eligible students
  - **sample**: randomly sampled students
  - **weight1**
  - **servcourse** to determine if participation in service-learning has changed
  - **IRsex/IRgender** to see if there are differences by sex
    - Note that the variable IRsex changed variable names from 2013 to 2014!

Task 5:

# Merge Multiple Years of Data



# Merging Multi-Year 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

# 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
- 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 wants to “keep” the variables IRclass, eligible, sample, weight1, servcourse, and IRsex/IRgender

| NSSE 2013 Items and Variables |                             |                         | NSSE 2014 Items and Variables |                          |                         | Comparisons   |
|-------------------------------|-----------------------------|-------------------------|-------------------------------|--------------------------|-------------------------|---|
| <i>Variable Name</i>          | <i>Variable Label</i>       | <i>Response Options</i> | <i>Variable Name</i>          | <i>Variable Label</i>    | <i>Response Options</i> | <i>2013–2014</i>  |
| IRgender                      | Institution-reported gender | 0=Female<br>1=Male      | IRsex                         | Institution-reported sex | 0=Female<br>1=Male      | Variable name changed to differentiate "sex" from "gender." |

- We need to account for the change in variable names between 2013 and 2014

# Merging Multi-Year NSSEville State University Data

```
GET FILE='C:\temp\NSSEville 2013.sav' /KEEP IRclass eligible sample weight1 IRgender servcourse.  
COMPUTE Year = 2013 .  
VARIABLE LABELS Year 'The year the data were collected' .  
VALUE LABELS Year  
    2013 '2013' .  
EXECUTE .  
RENAME VARIABLES IRgender=IRsex.  
SAVE OUTFILE='C:\temp\2013.sav'.
```

```
GET FILE='C:\temp\NSSEville 2015.sav' /KEEP IRclass eligible sample weight1 IRsex servcourse.  
COMPUTE Year = 2015 .  
VARIABLE LABELS Year 'The year the data was collected' .  
VALUE LABELS Year  
    2015 '2015' .  
EXECUTE .  
SAVE OUTFILE='C:\temp\2015.sav'.
```

```
GET FILE='C:\temp\2013.sav'.  
ADD FILES /FILE=*  
    /FILE='C:\temp\2015.sav'.  
EXECUTE.  
SAVE OUTFILE='C:\temp\NSSEville 2013 2015.sav'.
```

After running this syntax, I now have an SPSS dataset called “NSSEville 2013 2015” with the six variables I wanted to use in my analyses and a new variable that identifies the year of the data.

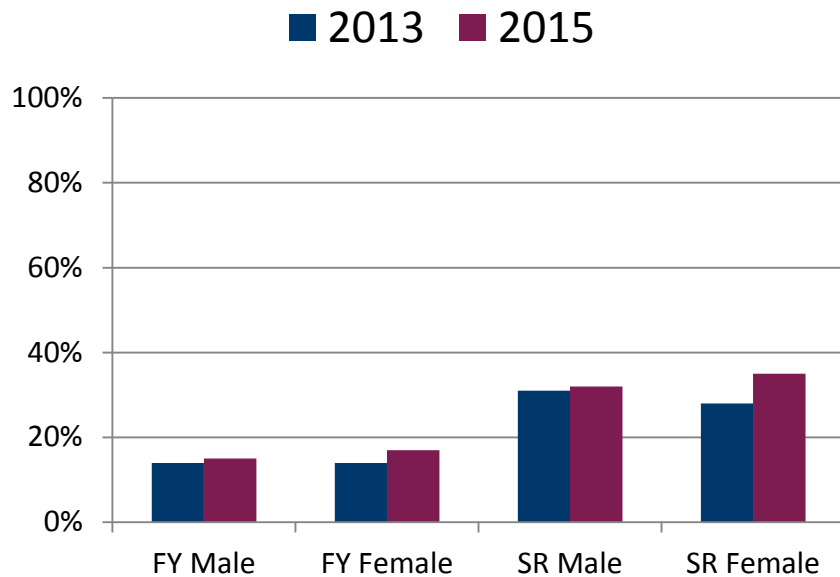
# NSSEville Results

**About how many of your courses at this institution have included a community-based project (service-learning)? [None, Some, Most, All]**

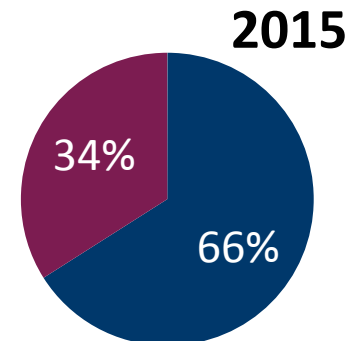
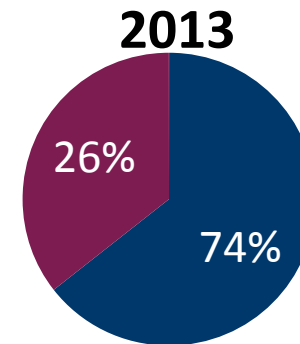
|                | N   | % at least "Some" | Statistical Difference? | Effect Size    |
|----------------|-----|-------------------|-------------------------|----------------|
| 2013 FY Male   | 69  | 14%               | NO                      |                |
| 2015 FY Male   | 133 | 15%               |                         |                |
| 2013 FY Female | 306 | 14%               | NO                      |                |
| 2015 FY Female | 309 | 17%               |                         |                |
| 2013 SR Male   | 82  | 31%               | NO                      |                |
| 2015 SR Male   | 143 | 32%               |                         |                |
| 2013 SR Female | 238 | 28%               | YES***                  | .13<br>(small) |
| 2015 SR Female | 325 | 35%               |                         |                |



# NSSEville Results



Percent of seniors participating in service-learning (in at least *some* of their courses) by sex

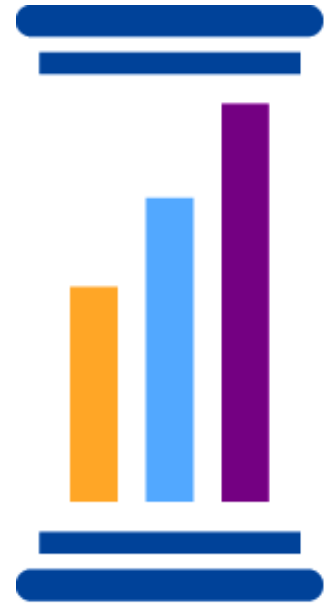


■ None

■ at least Some

About how many courses at this institution have included a community-based project (service-learning)

# 2013 Survey Update Considerations



# Before and After the Update

- Survey overhaul in 2013
- If you're using longitudinal data before 2013
  - See the NSSE website for guides and resources
  - See your **Multi-Year Benchmark Report**
- If you're using longitudinal data after 2012
  - Use the methods and resources in this presentation
  - Look for guides and resources on the NSSE website later this fall
  - See your 2015 **Multi-Year Engagement Indicator** report (if applicable)

# Analyzing Data Before and After the Update

- We strongly recommend against trying to analyze longitudinal data before and after the update (2012 and 2015 data, for example)
- Benchmark scores and Engagement Indicator scores CANNOT be compared
  - There is no way to convert Benchmark and Engagement Indicator scores to be comparable
- Only a quarter of survey items remained the same but they should be compared with caution

# Comparing the Comparisons

NSSE 2011

NSSE 2013

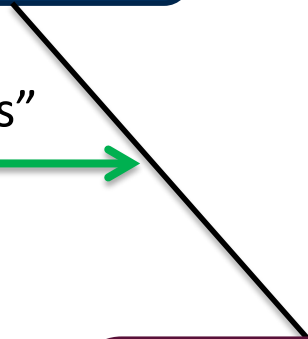
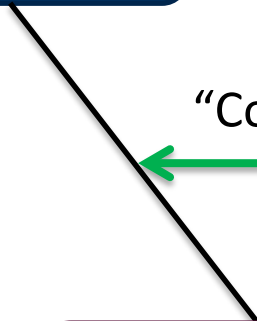
First-Year

First-Year

“Comparing the Comparisons”

Comparison  
Group ‘11

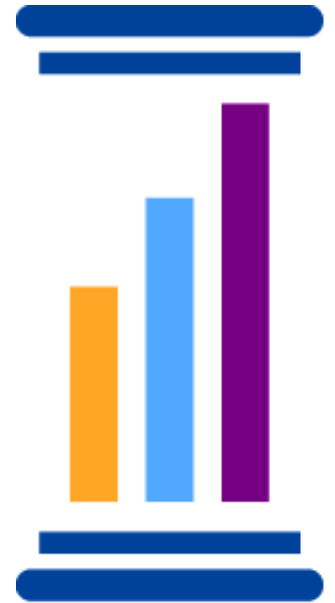
Comparison  
Group ‘13



# Comparing the Comparisons

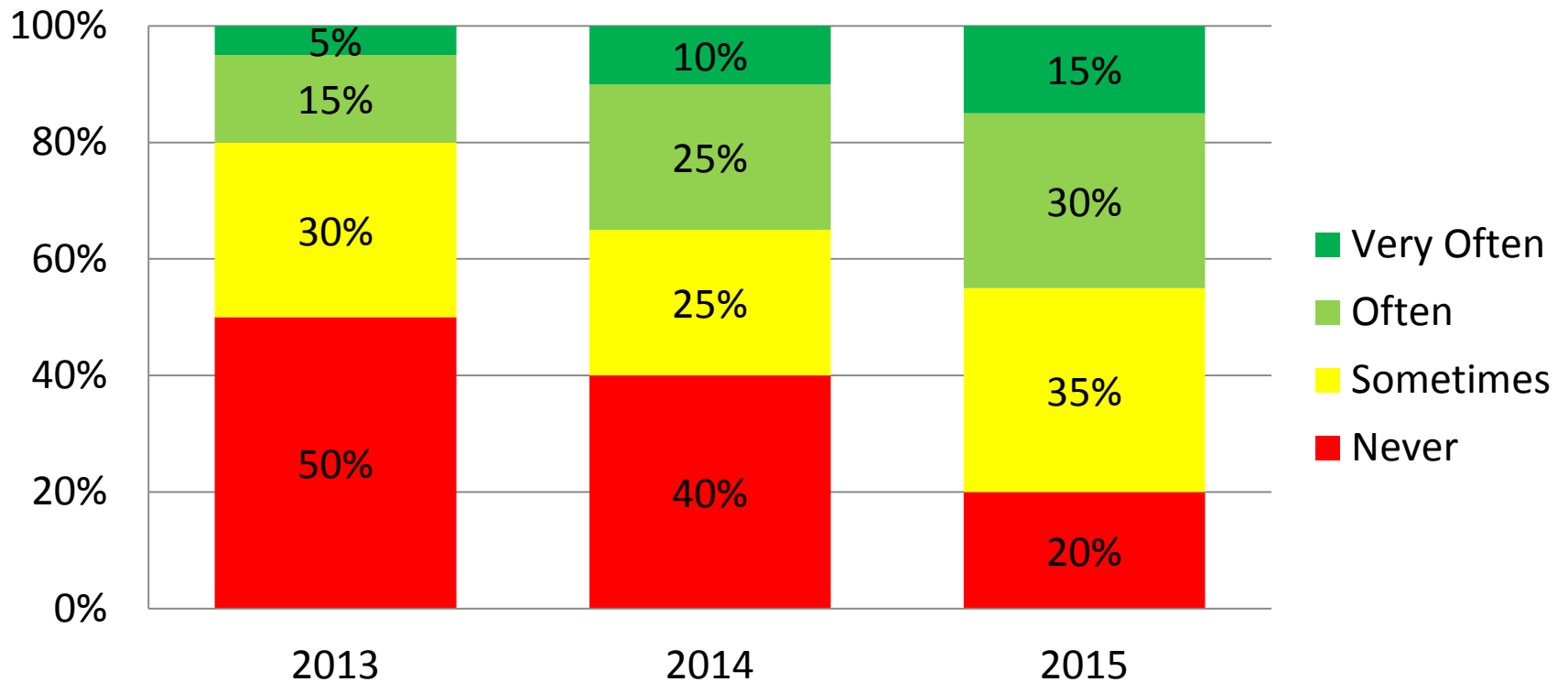
- If comparing the comparisons using Benchmark scores and Engagement Indicator scores, compare the comparisons for individual items within these measures to see how individual items may drive overall scores
- Note that comparison groups will not likely be identical over time so any comparison of comparisons should be made with caution

# Multi-Year Results Examples



# Multi-Year Results

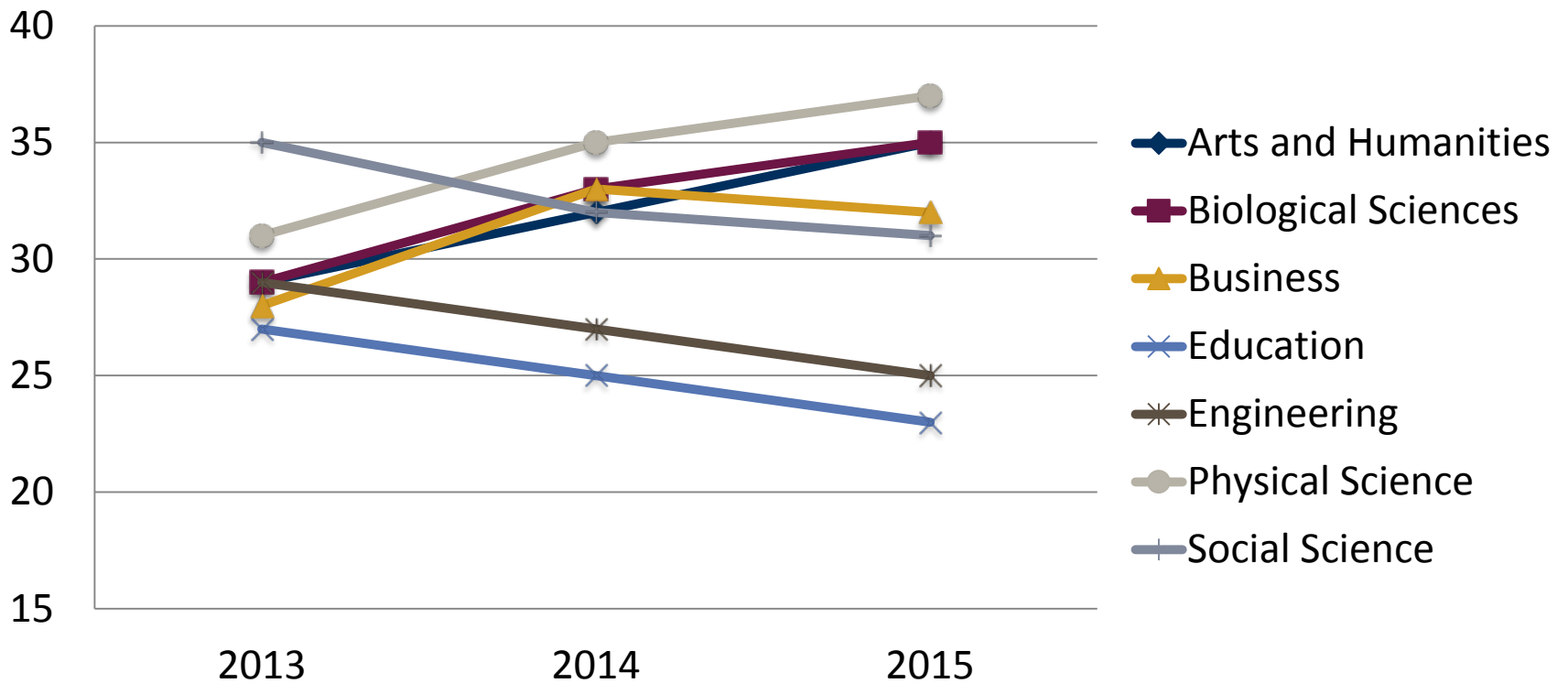
Percentage of students that explained course material to one or more students



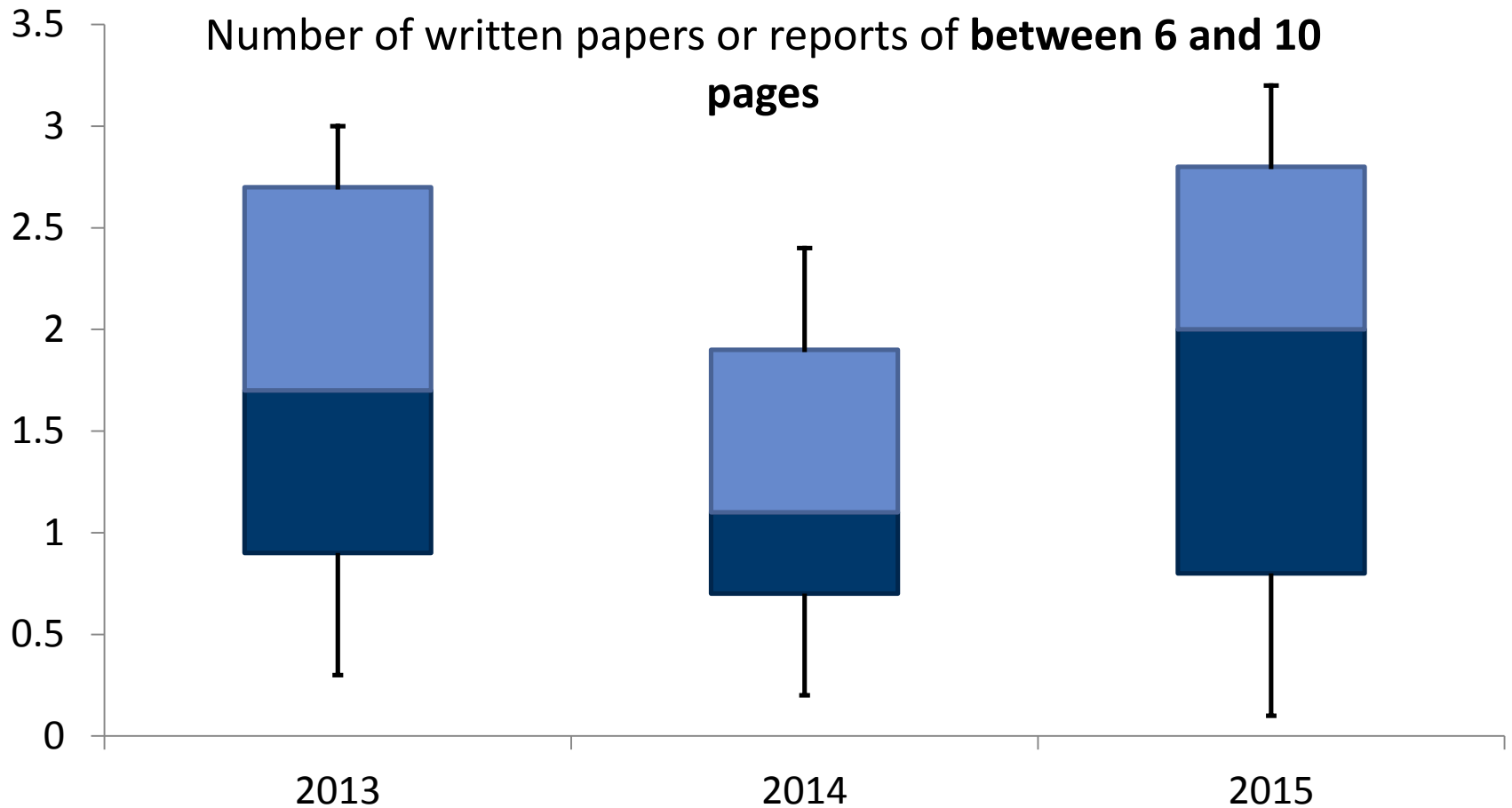


# Multi-Year Results

Percentage of excellent ratings of the quality of interactions with academic advisors



# Multi-Year Results



# Questions?

Allison BrckaLorenz  
abrckalo@indiana.edu

Louis Rocconi  
lrocconi@indiana.edu

[www.nsse.iub.edu](http://www.nsse.iub.edu)

