



Reporting and Data Visualization

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Meet the presenters.



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Workshop series

2018

October 2 **Data, Research, and Evidence Overview**
November 28 **Surveys and Focus Groups**

2019

January 29 **Interviews, Observations, and Rubric
Development**
March 4 **Reporting and Data Visualization**
April 1 **Understanding and Interpreting
Qualitative and Quantitative Evidence**



Today's goals

1. Discuss best practices for developing **effective research reports**.
2. Provide overview of different types of **visual displays**.
3. Discuss strategies of how ISBE can use survey data and research findings to **drive decisionmaking**.

Effective research reports

Effective research reports:

- ✓ **Include relevant background information**
- ✓ **Describe methodology**
- ✓ **Highlight key findings**
- ✓ **Have clear implications and note limitations**
- ✓ **Are accessible**

To Do



Determine format



Consider purpose



Target audience

Effective research reports:

- ✓ **Include relevant background information**
- ✓ Describe methodology
- ✓ Highlight key findings
- ✓ Have clear implications and note limitations
- ✓ Are accessible

Background section

**Who wanted the
research
conducted? Why?**

**What else do we
know about the
topic?**

Effective research reports:

- ✓ Include relevant background information
- ✓ **Describe methodology**
- ✓ Highlight key findings
- ✓ Have clear implications and note limitations
- ✓ Are accessible

**Methodology
section**

**How did we
conduct the
research?**

Effective research reports:

- ✓ Include relevant background information
- ✓ Describe methodology
- ✓ **Highlight key findings**
- ✓ Have clear implications and note limitations
- ✓ Are accessible

**Results
section**

**What did we
learn?**

Know your audience.

Align format
and style to
audience.



Let your audience know the key findings up front, then elaborate on them in the full report.



Emphasize summary statements and key findings and make them easy to understand.



What would you write to accompany this table? What would you highlight?

Table 5. Percentage distribution of the frequency teacher teams meet, by school type: Fall 2012

	Less than once a week	About once a week	Two or more times a week
Total (<i>N</i> = 681)	32%	38%	30%
Elementary school (<i>N</i> = 355)	25%	43%	32%
Middle school (<i>N</i> = 144)	28%	36%	36%
High school (<i>N</i> = 182)	55%	33%	12%

NOTE: Percentages may not add to 100% due to rounding.

Activity 1. Developing a research report

Break

Data visualization

Example

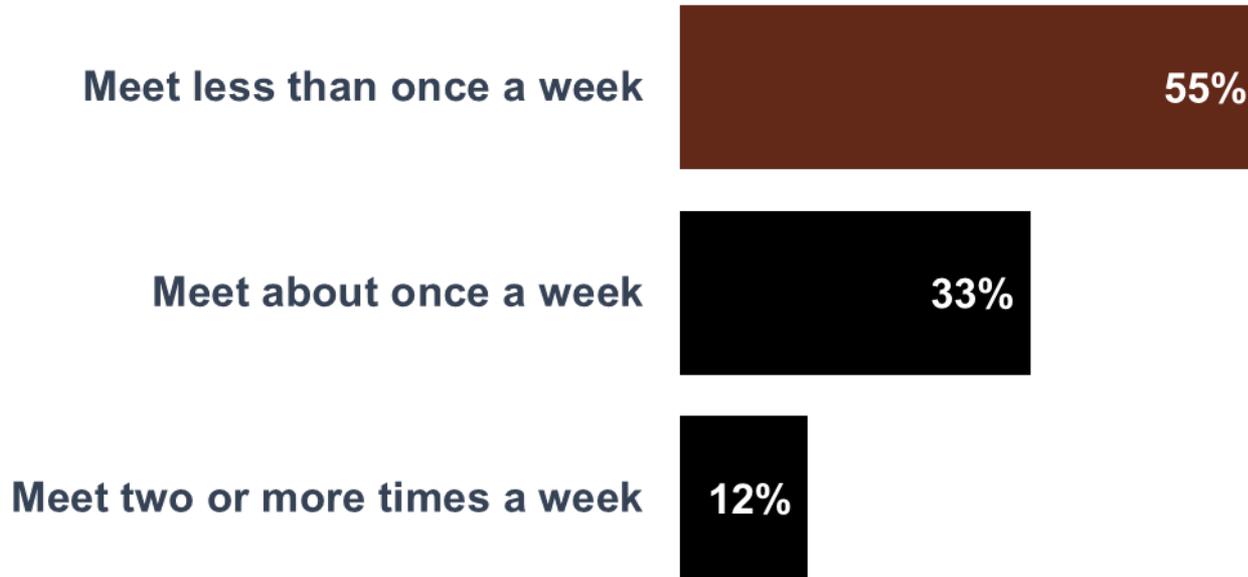
Teacher teams in high schools tend to meet less frequently than teams in elementary and middle schools.

Principals reported the frequency that teachers in their school meet to work collaboratively. Across all school types, 30 percent met two or more times per week, 38 percent met about once a week, and 32 percent met less than once a week (table 5).

A smaller percentage of high school principals reported that the teacher teams met two or more times a week (12 percent) compared to those in elementary schools (38 percent) or middle schools (32 percent).

Include visual displays of your key findings.

Most High School Teacher Teams Meet Less than Once a Week



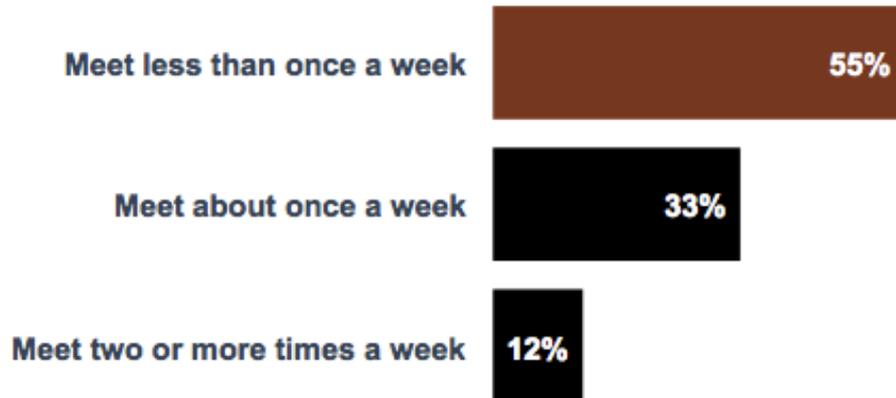
Include visual displays of your key findings.

Many Elementary School Teacher Teams Meet Once a Week



Include visual displays of your key findings.

Most High School Teacher Teams Meet Less than Once a Week



Many Elementary School Teacher Teams Meet Once a Week



**There are many ways
to present data.**

- Text
- Tables
- Charts

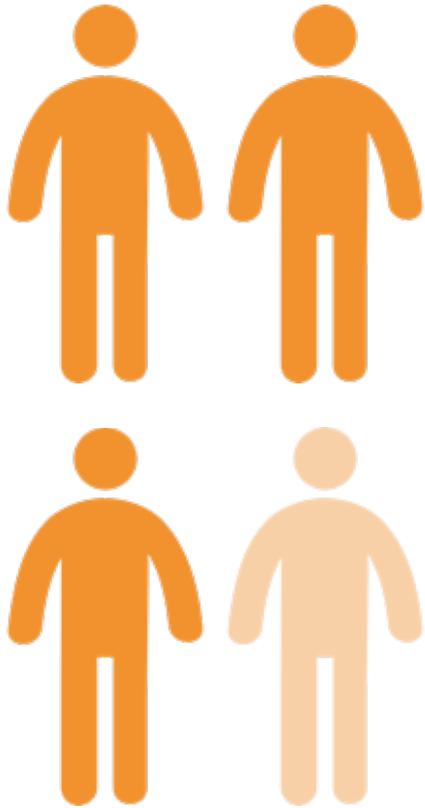


Use text when you are conveying one or two numbers.

For example:

45% of special education elementary school teachers have a master's degree.

Consider using icons to illustrate a statistic.

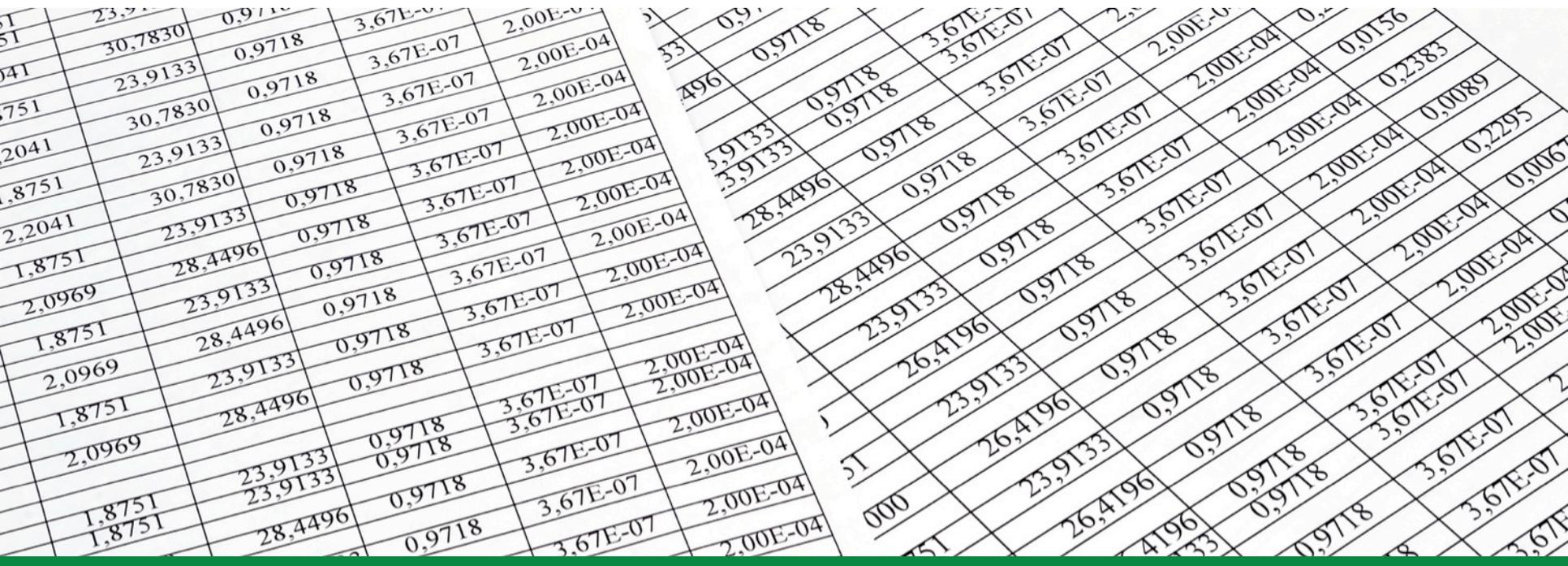


75%

of superintendents are in favor of the new guidelines.

Use tables when:

Communicating structured numeric information



The background image displays two overlapping spreadsheets. The left spreadsheet has columns with values: 23,9133, 30,7830, 0,9718, 3,67E-07, and 2,00E-04. The right spreadsheet has columns with values: 23,9133, 28,4496, 0,9718, 3,67E-07, 2,00E-04, 26,4196, 0,9718, 3,67E-07, 2,00E-04, and 0,2295. The spreadsheets are tilted and partially obscured by each other.

Tables

Table 2

Correlations Among Primary Constructs

	2	3	4	5	6	7	8	9	10
1. Adolescent depression	-.04	.24*	-.33**	.00	.19+	.20+	.11	.03	-.09
2. Maternal depression	–	.19+	.02	.10	.08	-.14	.10	.07	-.41***
3. Alienation		–	-.61***	.25*	.15	.24*	.15	.28**	.03
4. Communication			–	-.08	-.17	-.32**	-.09	-.14	-.22*
5. General delinquency scale				–	.23*	.24*	.27**	.14	-.16
6. Alcohol and drug problems					–	.49***	.38**	.53***	.25**
7. Alcohol frequency						–	.48***	.47***	.29**
8. Marijuana frequency							–	.32**	.08
9. Hard drugs								–	.21+
10. Income									–

Note: *** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, + $p \leq .10$.

N = 88

Use charts when:

You want to better illustrate trends in your data



What chart should you use?



Bar



Clustered Bar



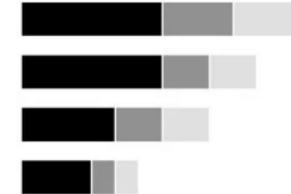
Side-by-Side Bar



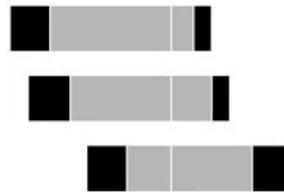
Back-to-Back Bar



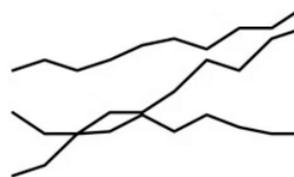
Small Multiples Bar



Stacked Bar



Diverging Stacked Bar



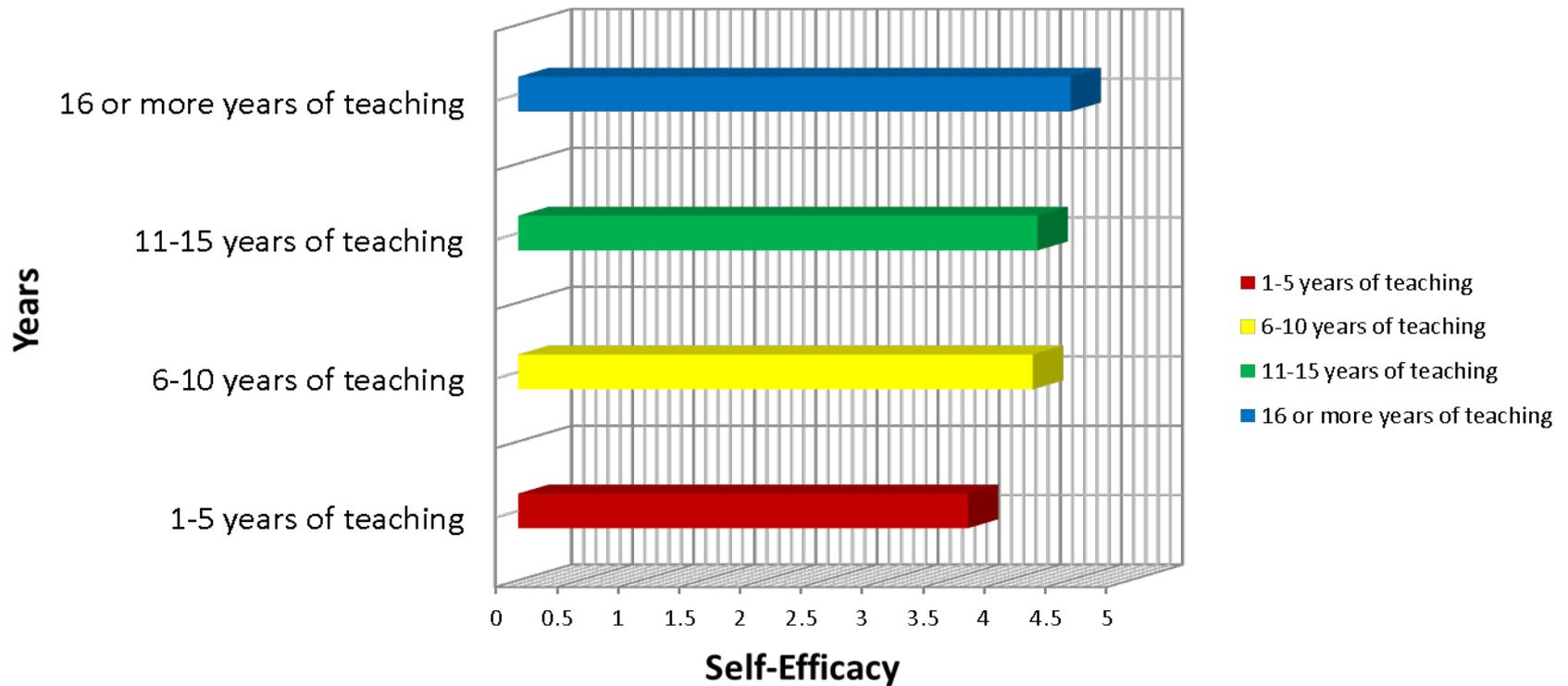
Line



Area

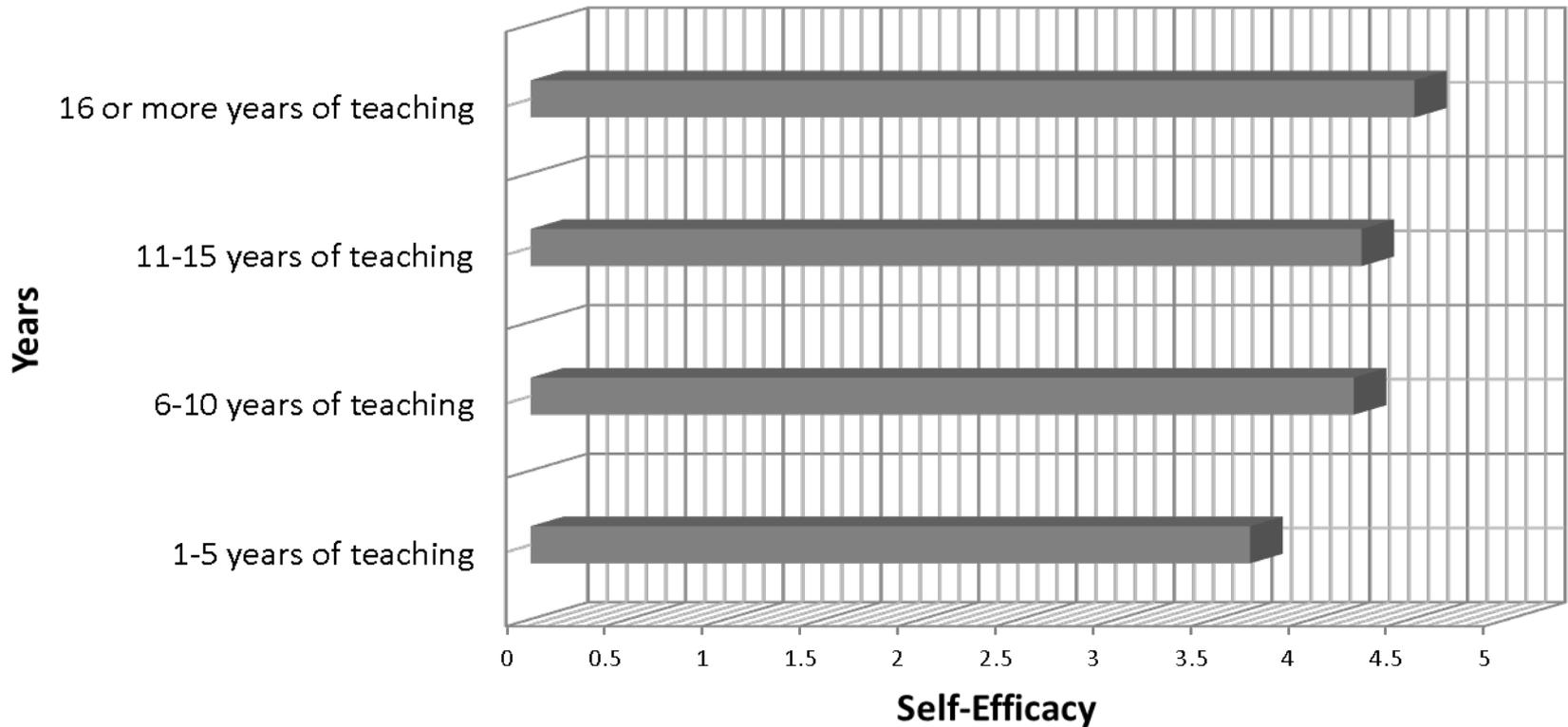
Remove meaningless color.

Self-Efficacy, by Number of Years Teaching



Remove excessive lines.

Self-Efficacy, by Number of Years Teaching



Avoid 3-D charts.

Self-Efficacy, by Number of Years Teaching



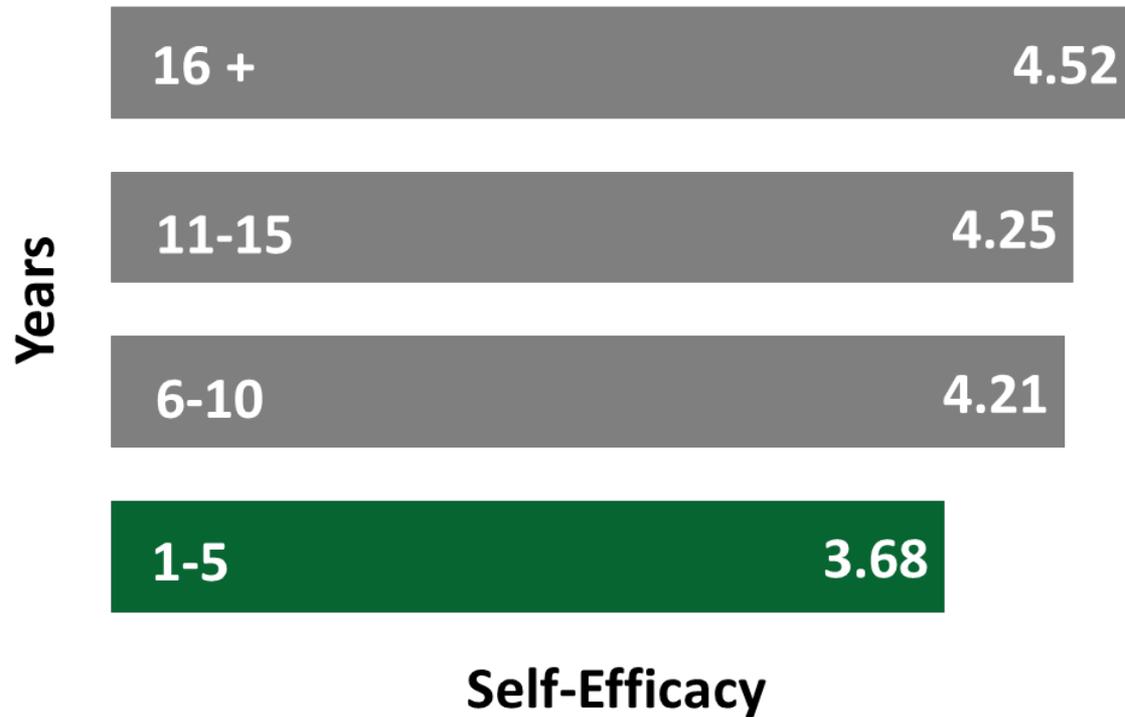
Add data labels.

Self-Efficacy, by Number of Years Teaching



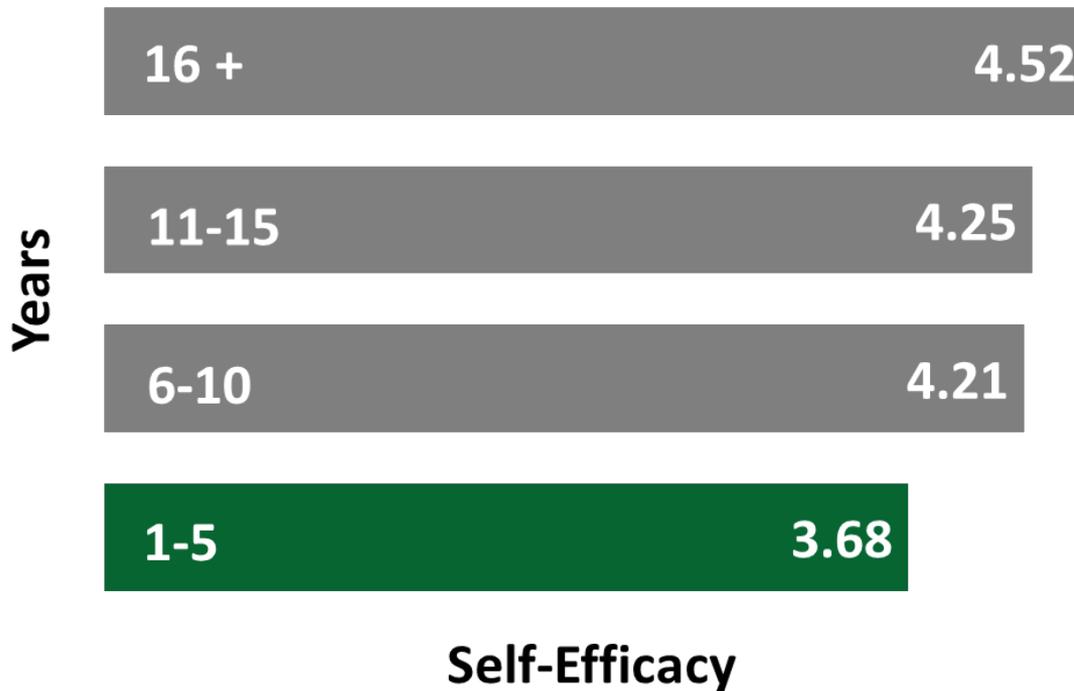
Keep it clean and emphasize with color.

Self-Efficacy By Number of Years Teaching



Add a statement figure title.

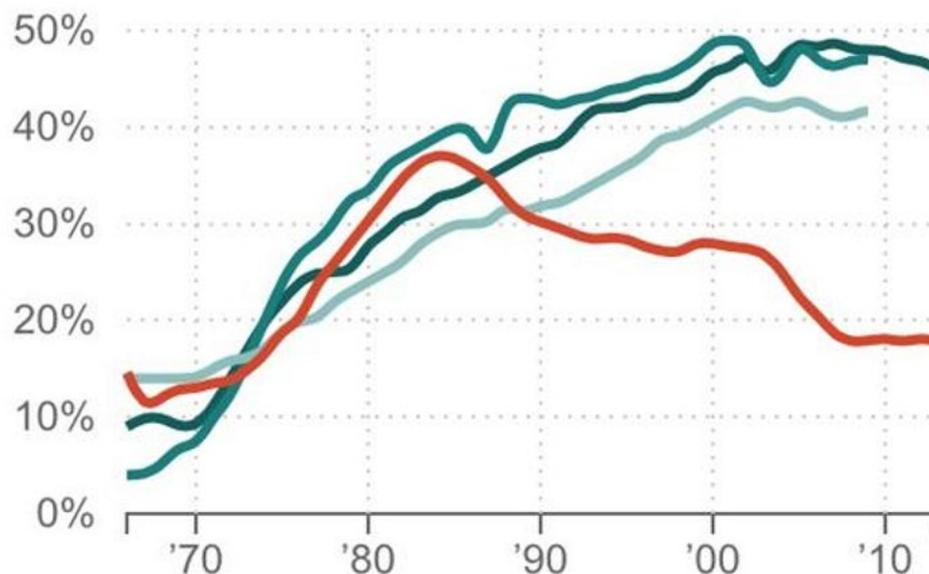
The **Least** Experienced Teachers Have the Lowest Self-Efficacy



Label data directly.

What Happened To Women In Computer Science?

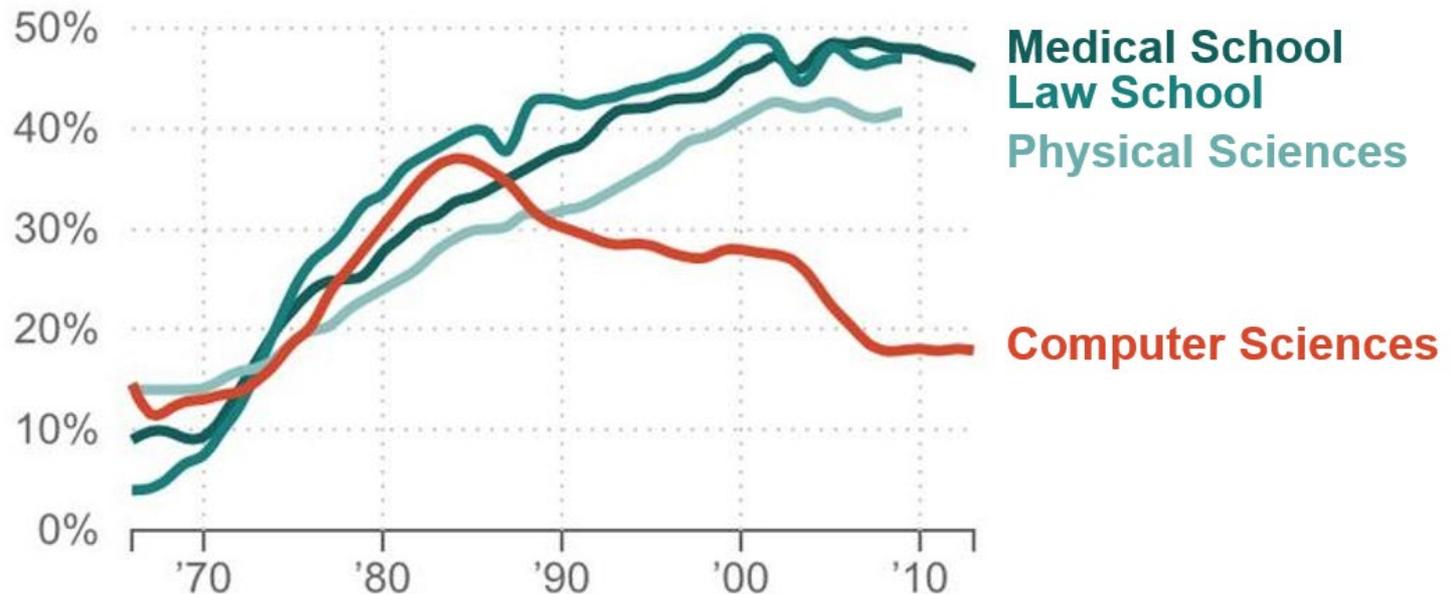
% Of Women Majors, By Field



Label data directly.

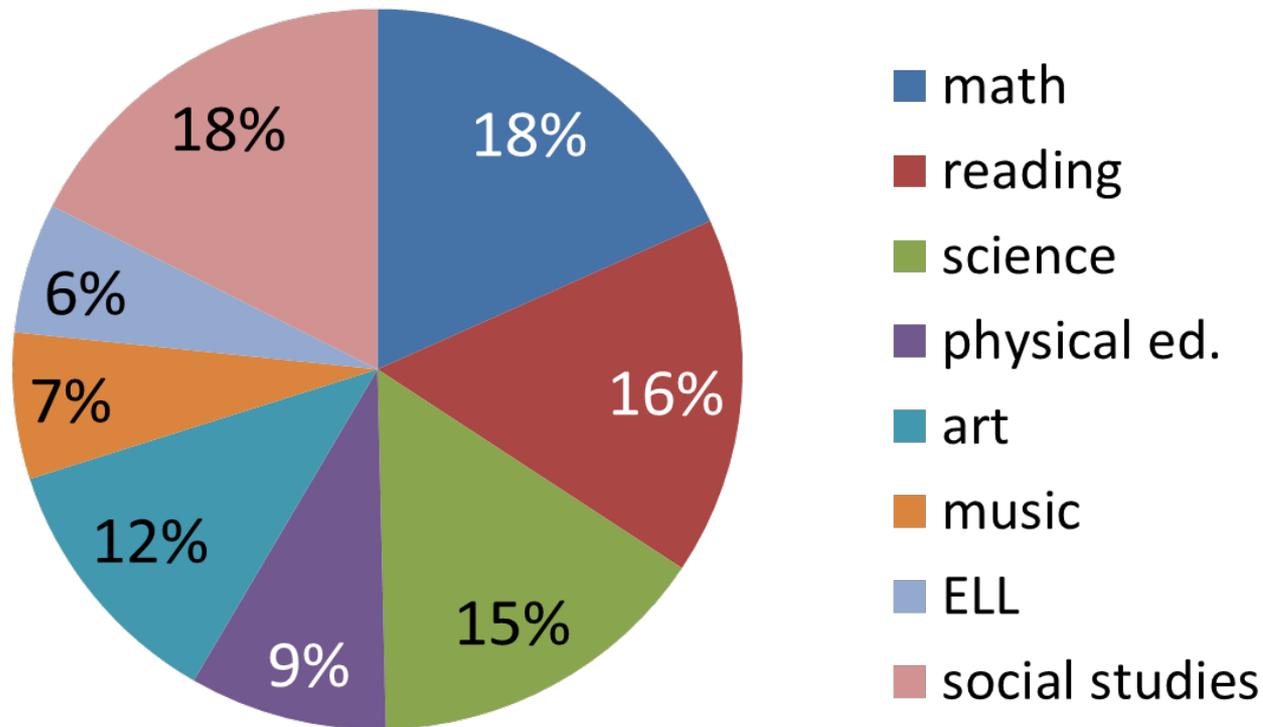
What Happened To Women In Computer Science?

% Of Women Majors, By Field

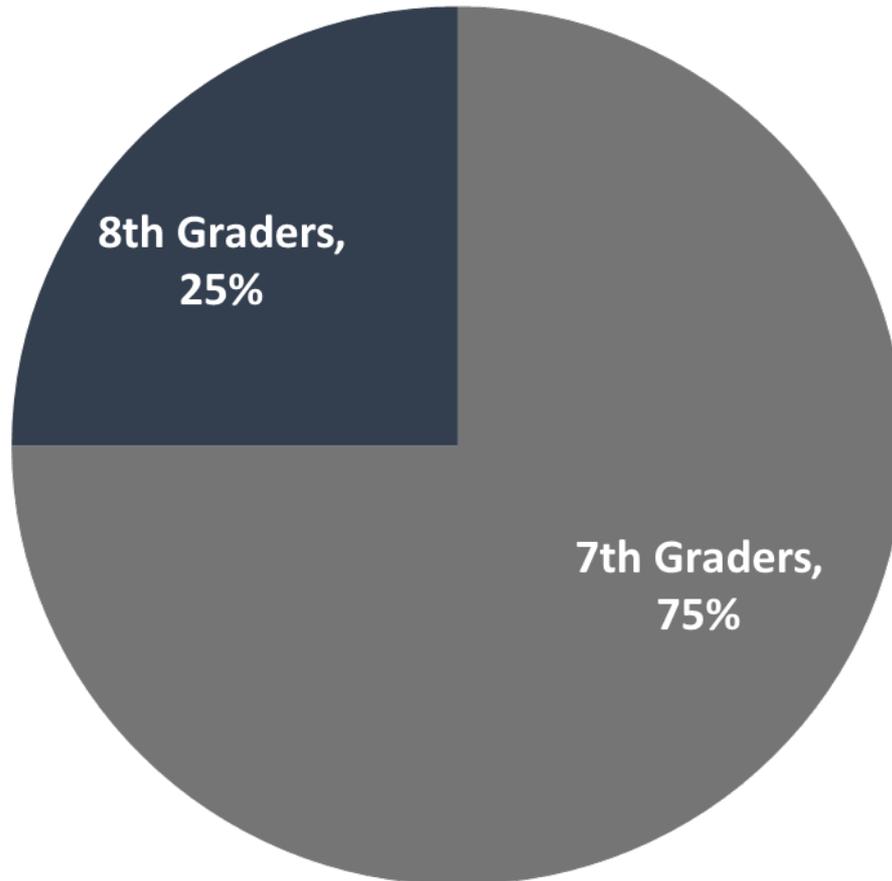


Avoid pie charts for more than two values.

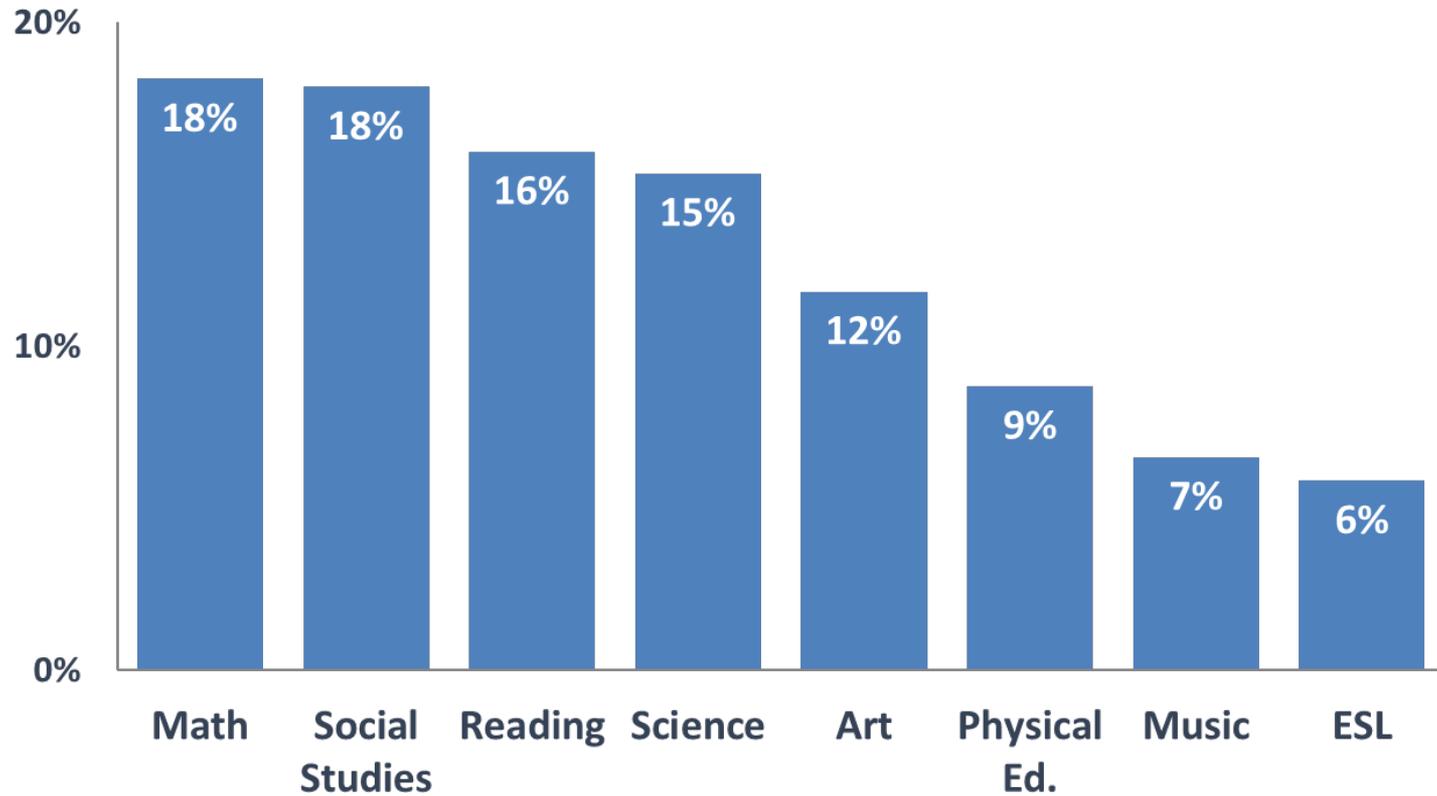
Primary teaching assignment



Pie charts with two categories are easy to interpret.

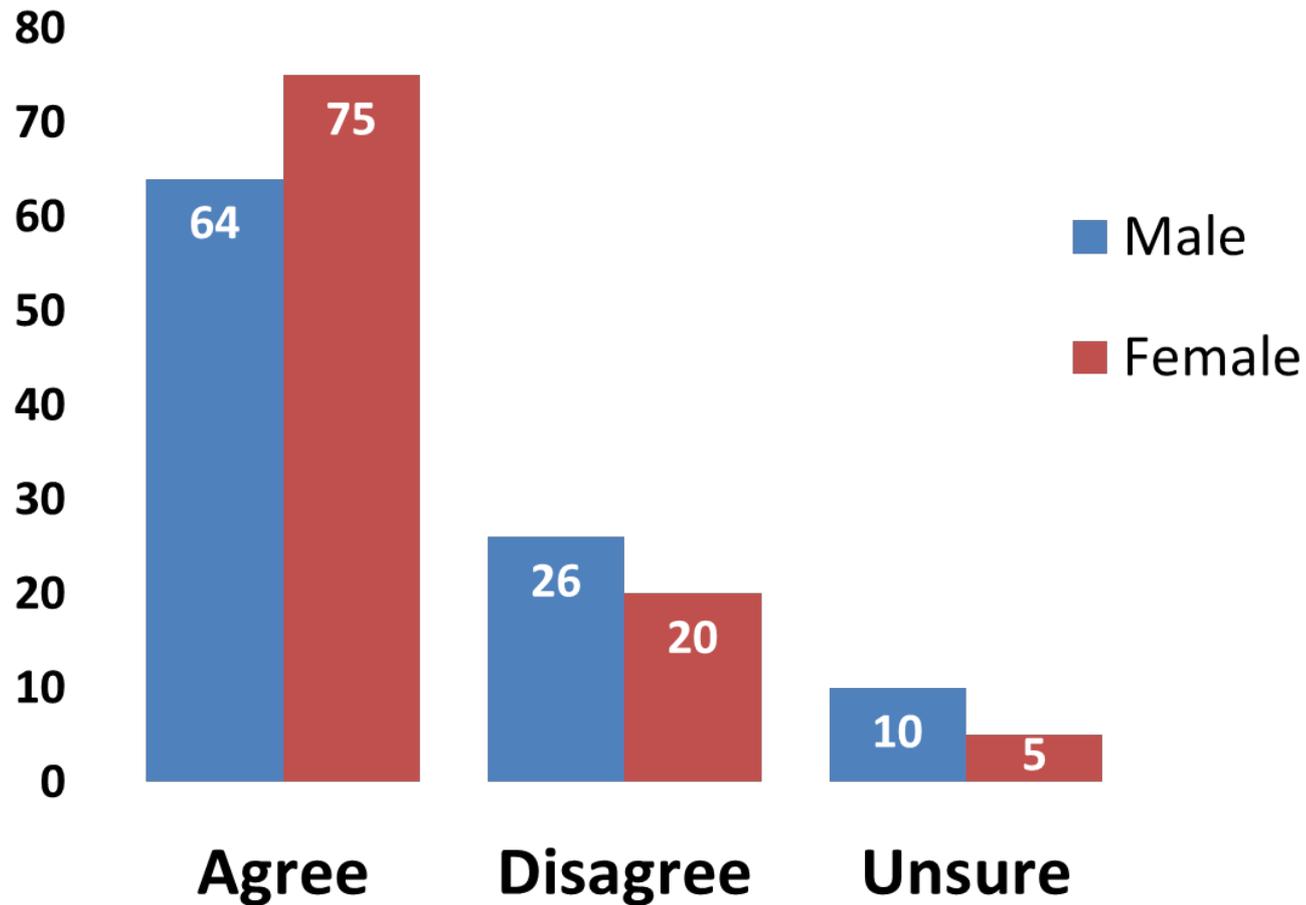


For many categories, clean bar charts are easier to read.

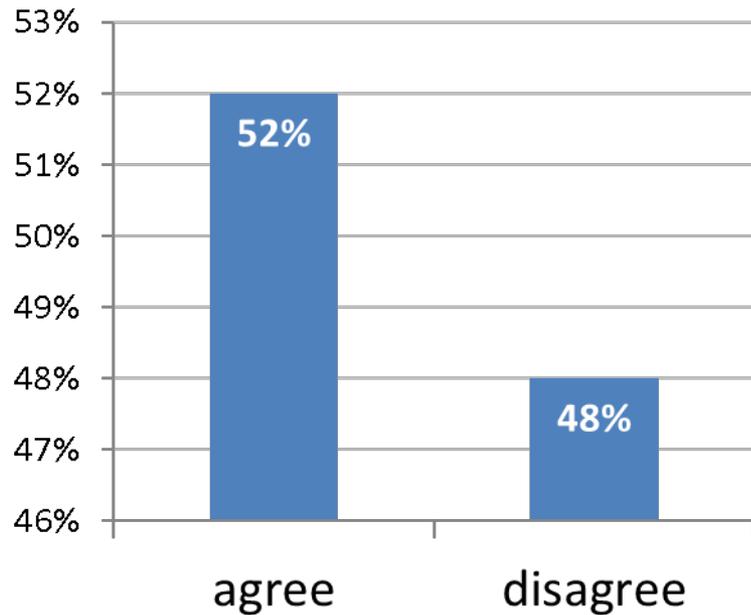


Teachers' primary teaching assignment

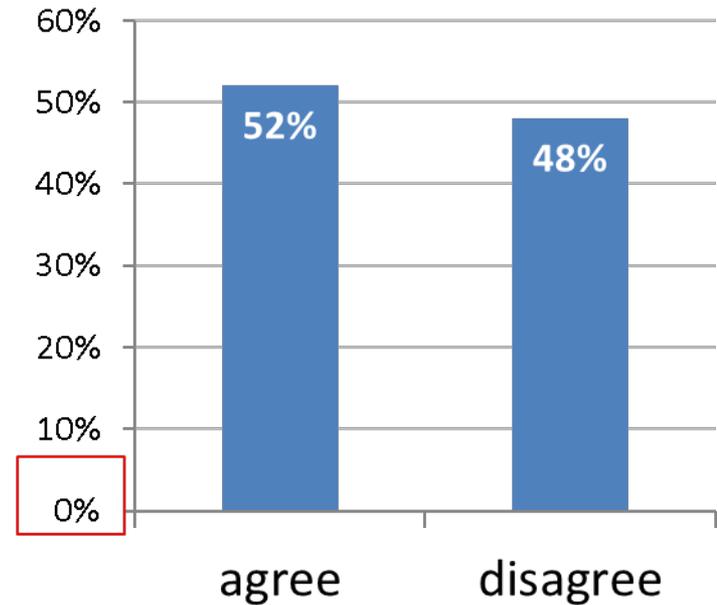
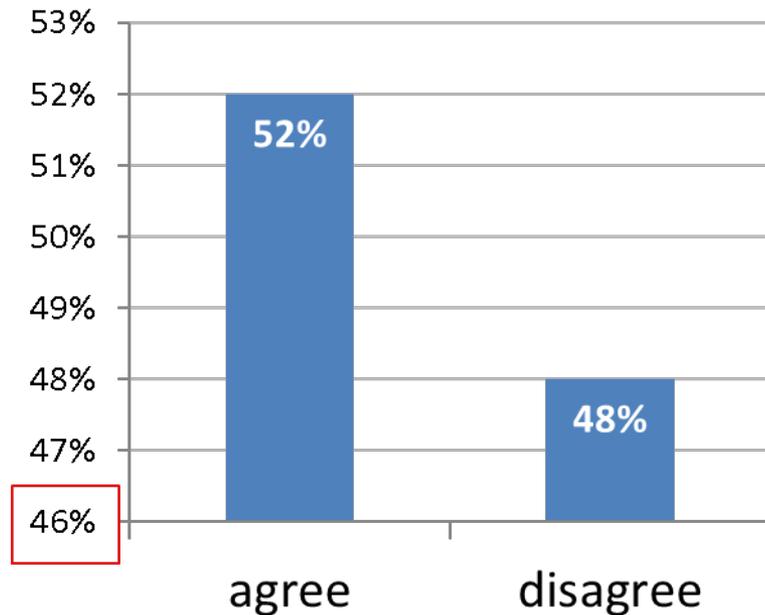
Use bar charts to compare groups.



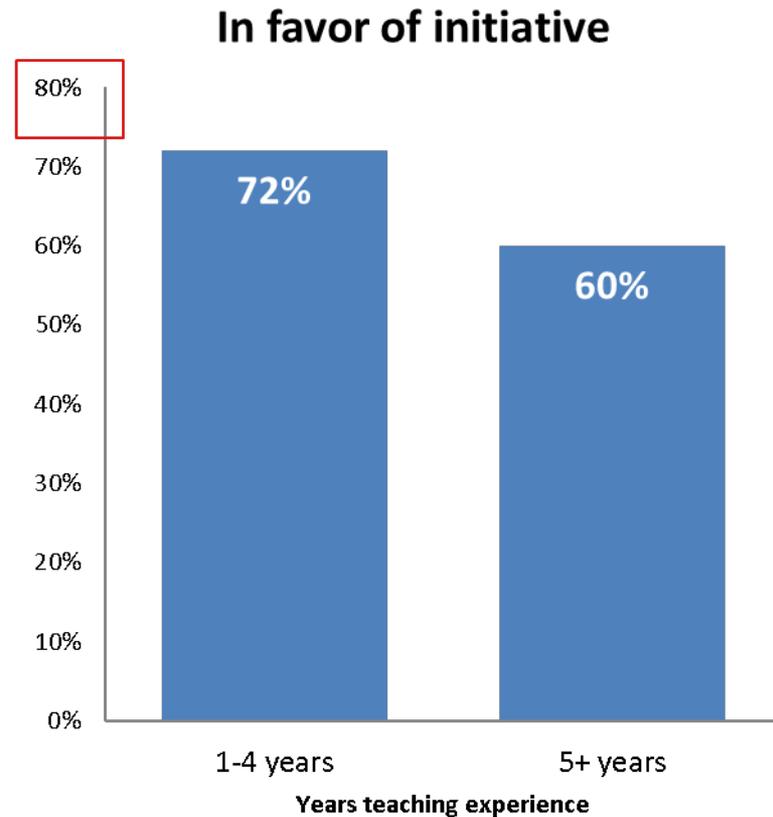
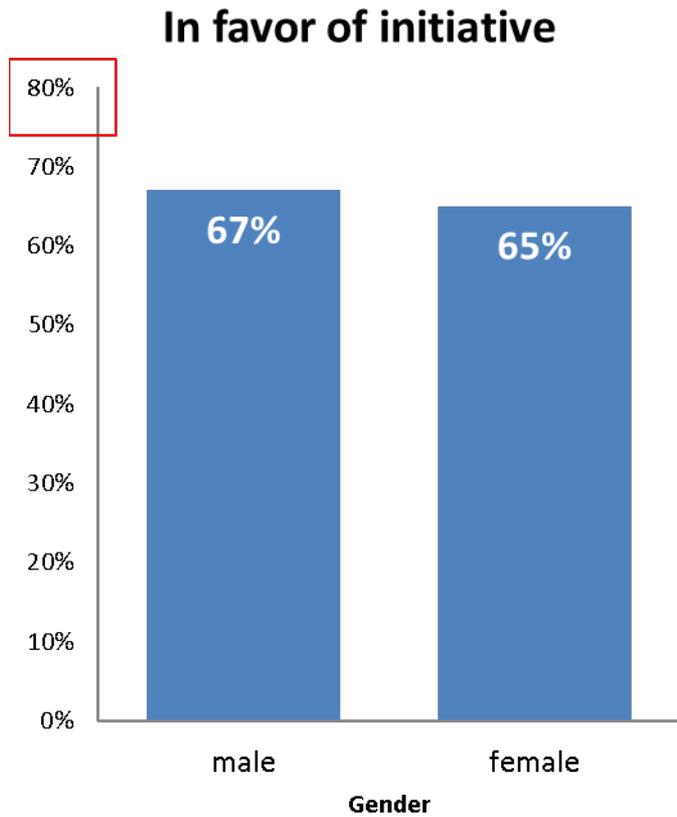
Start *y*-axis at zero to avoid distortion.



Start *y*-axis at zero to avoid distortion.



Y-axis height should be the same when presenting multiple graphs.



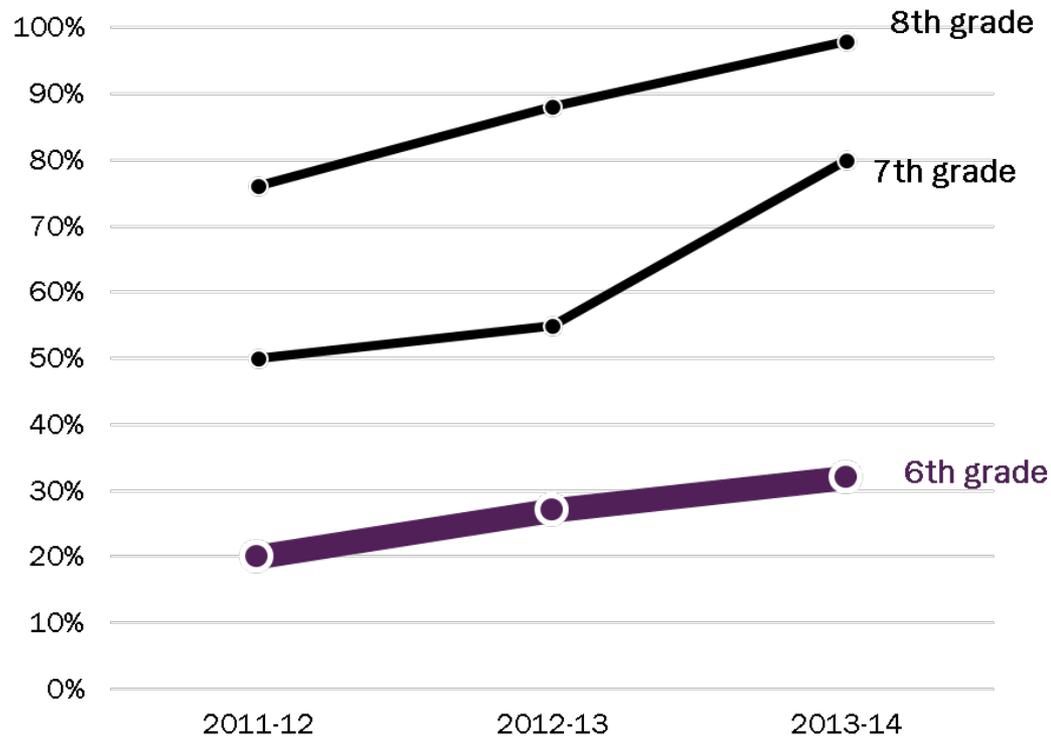
Example: Before

Science program participation rates

	2011/12	2012/13	2013/14
6th grade	20%	27%	32%
7th grade	50%	55%	80%
8th grade	76%	88%	98%

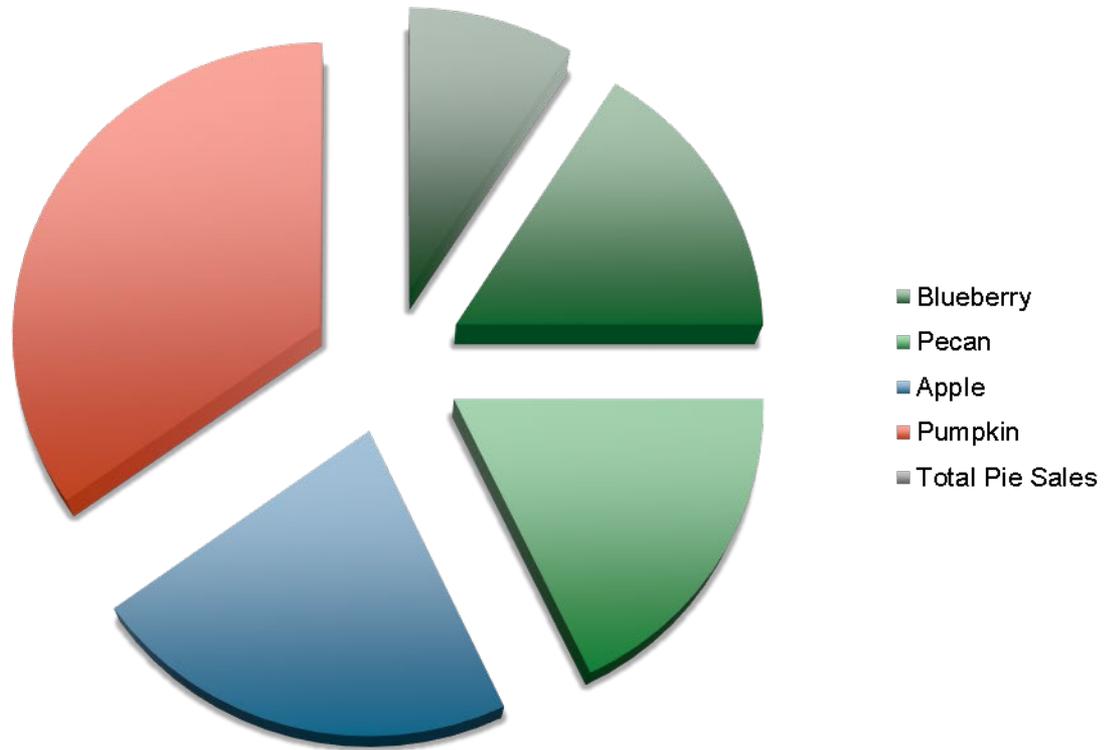
Example: After

6th grade students participate in the program at lower rates



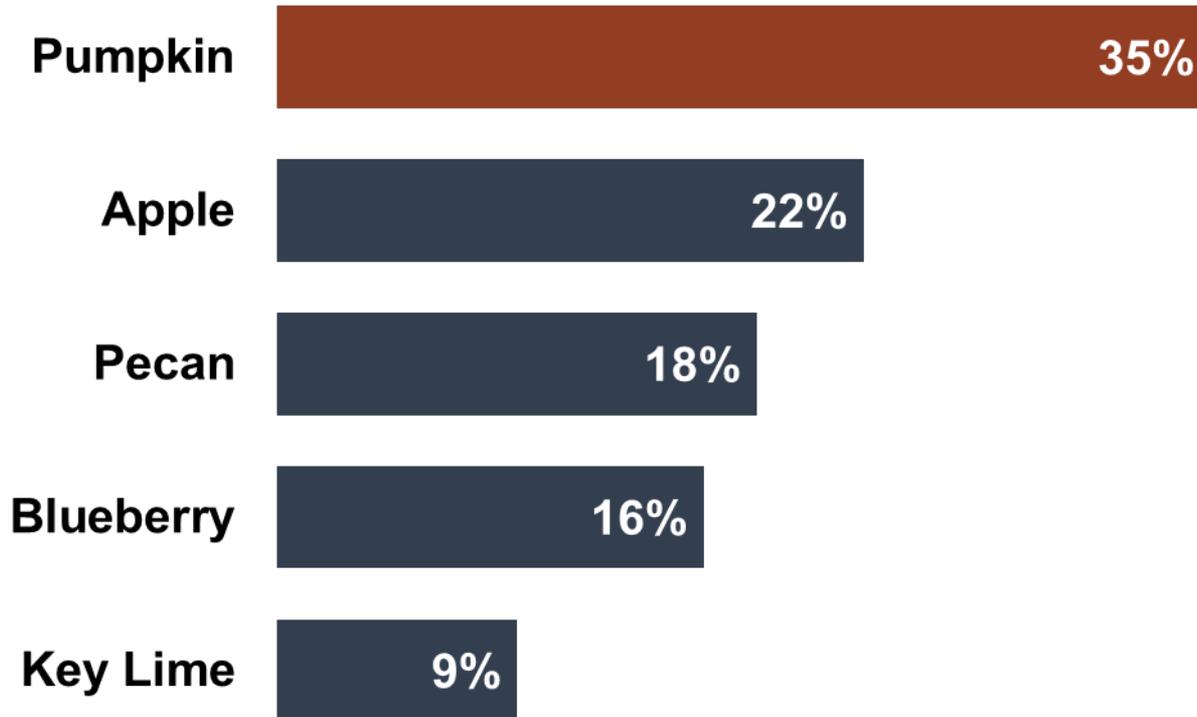
Example: Before

Total Pie Sales



Example: After

Total Pie Sales



Data visualization checklist

Data Visualization Checklist

by Stephanie Evergreen & Ann K. Emery
May 2014

This checklist is meant to be used as a guide for the development of high impact data visualizations. Rate each aspect of the data visualization by circling the most appropriate number, where 2 points means the guideline was fully met, 1 means it was partially met, and 0 means it was not met at all. n/a should not be used frequently, but reserved for when the guideline truly does not apply. For example, a pie chart has no axes lines or tick marks to rate. Refer to the Data Visualization Anatomy Chart on the last page for guidance on vocabulary.

	Guideline	Rating
Text Graphs don't contain much text, so existing text must encapsulate your message and pack a punch.	6-12 word descriptive title is left-justified in upper left corner Short titles enable readers to comprehend takeaway messages even while quickly skimming the graph. Rather than a generic phrase, use a descriptive sentence that encapsulates the graph's finding or "so what?" Western cultures start reading in the upper left, so locate the title there.	2 1 0 n/a
	Subtitle and/or annotations provide additional information Subtitles and annotations (call-out text within the graph) can add explanatory and interpretive power to a graph. Use them to answer questions a viewer might have or to highlight one or two data points.	2 1 0 n/a
	Text size is hierarchical and readable Titles are in a larger size than subtitles or annotations, which are larger than labels, which are larger than axis labels, which are larger than source information. The smallest text - axis labels - are at least 9 point font size on paper, at least 20 on screen.	2 1 0 n/a
	Text is horizontal Titles, subtitles, annotations, and data labels are horizontal (not vertical or diagonal). Line labels and axis labels can deviate from this rule and still receive full points.	2 1 0 n/a

Activity 2

Brainstorm

Share

- How can you use the data visualization techniques covered for your project?
- What are the most appropriate visual displays for your report?
- What key information do you want to disseminate?
- How can findings be used to drive decisionmaking?

Finalizing a research report: Implications and limitations

Effective research reports:

- ✓ Include relevant background information
- ✓ Describe methodology
- ✓ Highlight key findings
- ✓ **Have clear implications and note limitations**
- ✓ Are accessible

**Implications/
Discussion
section**

What does
this all mean?



Discuss the implications of your study, and include recommendations for future action based on key findings.

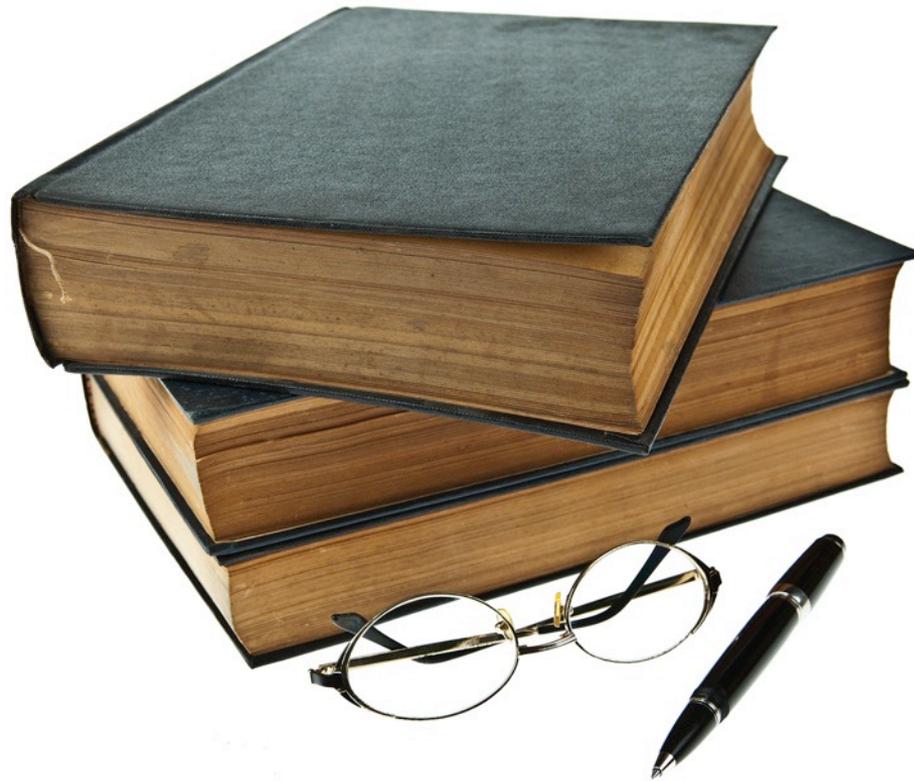
**Grab
attention**

**Clearly
communicate**

**Engage your
audiences**



Cite all data sources and references.



Effective research reports:

- ✓ Include relevant background information
- ✓ Describe methodology
- ✓ Highlight key findings
- ✓ Have clear implications and note limitations
- ✓ **Are accessible**

Oh!

**Light bulb moments?
Questions?**

References

- Evergreen, S., & Emery, A. K. (2014) *Data visualization checklist*. Retrieved from <http://stephanieevergreen.com/dataviz-checklist/>
- Radcliff, C. J., Jensen, M. L., Salem, J. A. Jr., Burhanna, K. J., & Gedeon, J. A. (2007). *A practical guide to information literacy assessment for academic librarians*. Westport, CT: Libraries Unlimited.
- Tufte, E. R., & Graves-Morris, P. R. (1983). *The visual display of quantitative information (Vol. 2, No. 9)*. Cheshire, CT: Graphics Press.