When Less *Really* is More:

Putting Data Visualization Best Practices to Work

Audrey Loper

National Implementation Research Network

Todd Jensen

UNC School of Social Work

Intended Results

- Reflect on your current data audience(s) and stakeholders
- Build a shared understanding of data viz best practices
- Reflect on your own work and action plan

Limiting Assumptions

- Data are of good quality
- Data are actionable
- Data viz authors had good intentions

Shout-outs

Ann K. Emery

http://depictdatastudio.com

Stephanie Evergreen

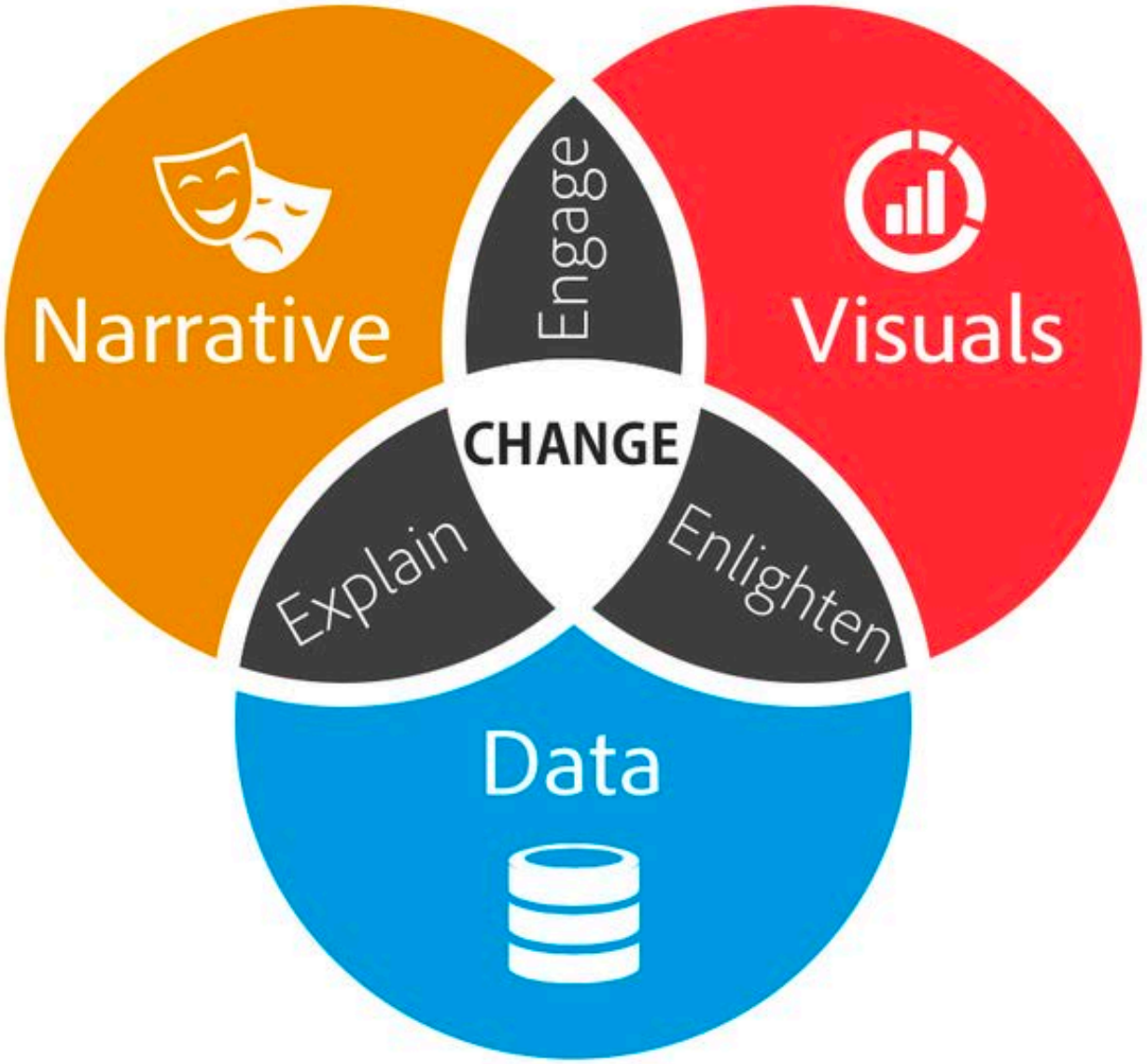
http://stephanieevergreen.com

Good data visualization . . .

- is an *accessible* story-telling tool
- supports equitable communication among stakeholders
- supports better data use for decision-making

Data Storytelling

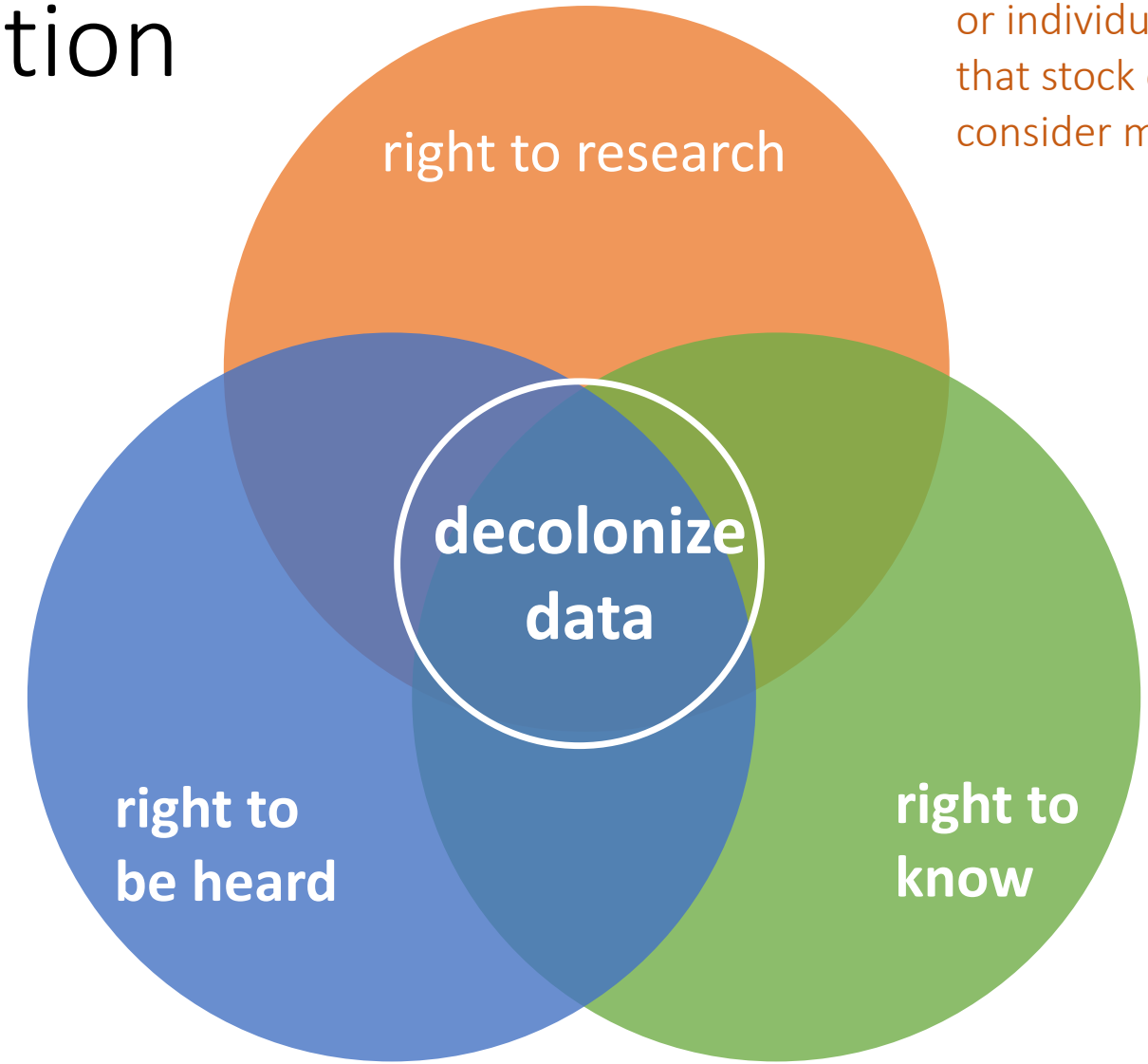
“When you package up your insights as a data story, you build a bridge for your data to the influential, emotional side of the brain."



Data Storytelling: The Essential Data Science Skill Everyone Needs. https://www.forbes.com/sites/brentdykes/2016/03/31/data-storytelling-the-essential-data-science-skill-everyone-needs/amp/

Equitable Data Communication

The right to the tools through which groups or individuals can systematically increase that stock of knowledge which they consider most vital to their survival



The right to use social science tools – such as surveys – *to package their knowledge into data to convey to decision-makers and other audiences*

The right to access information beyond their reach, whether that knowledge is inaccessible due to cost, technical jargon, or other barriers

Powering Health Equity Action with Online Data Tools: 10 Design Principles. https://nationalequityatlas.org/sites/default/files/10-Design-Principles-For-Online-Data-Tools.pdf

Data Use for Decision-Making

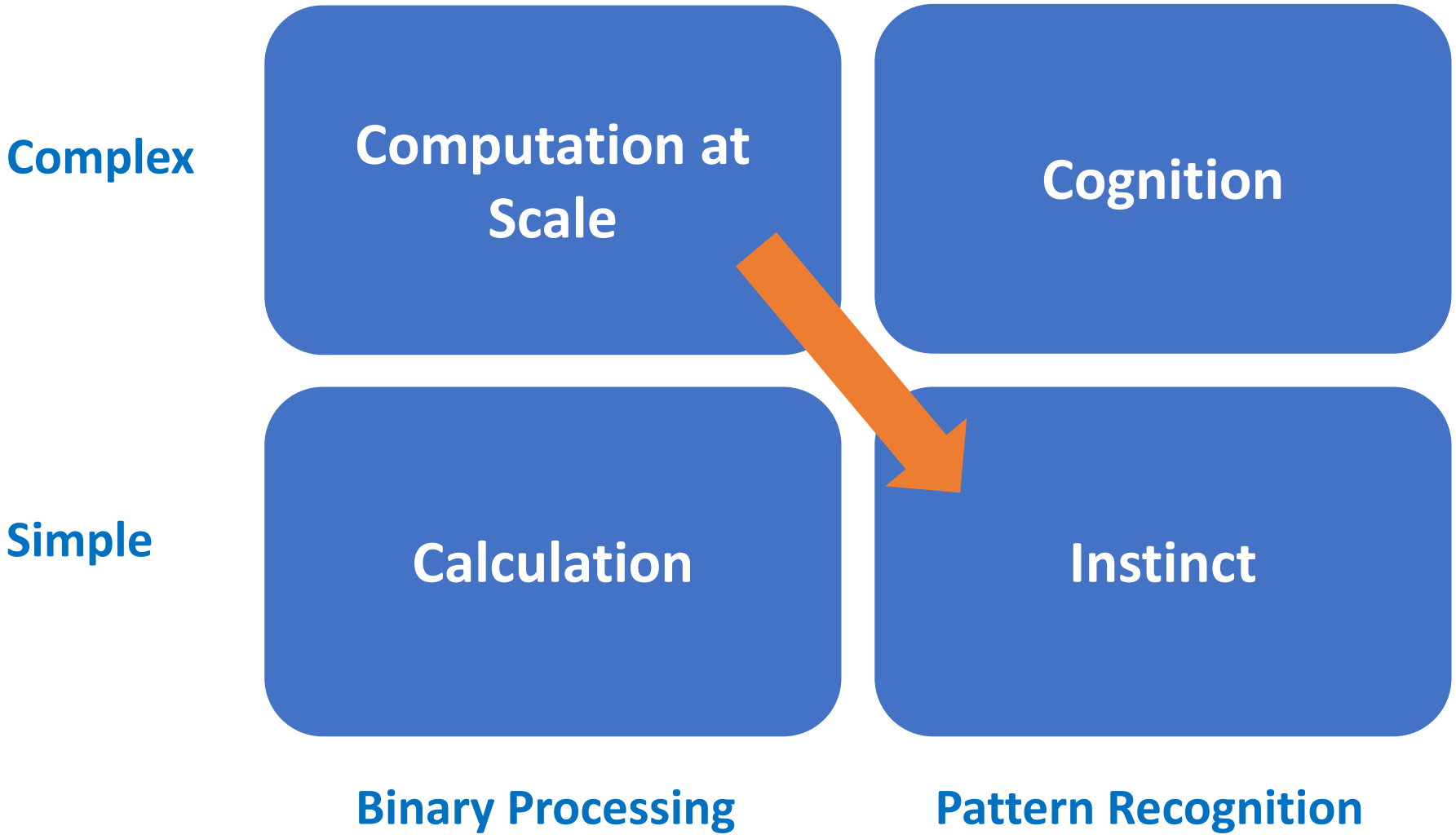
Active Implementation

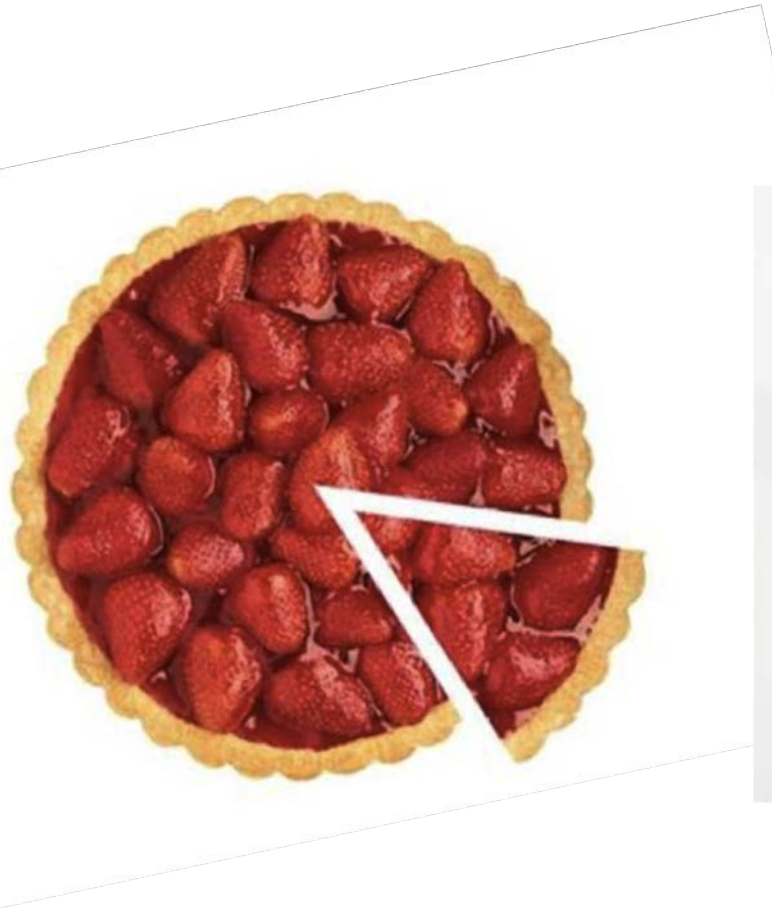
Effective Practices ✖ **Effective Implementation** ✖ **Enabling Context** = **Improved Outcomes**

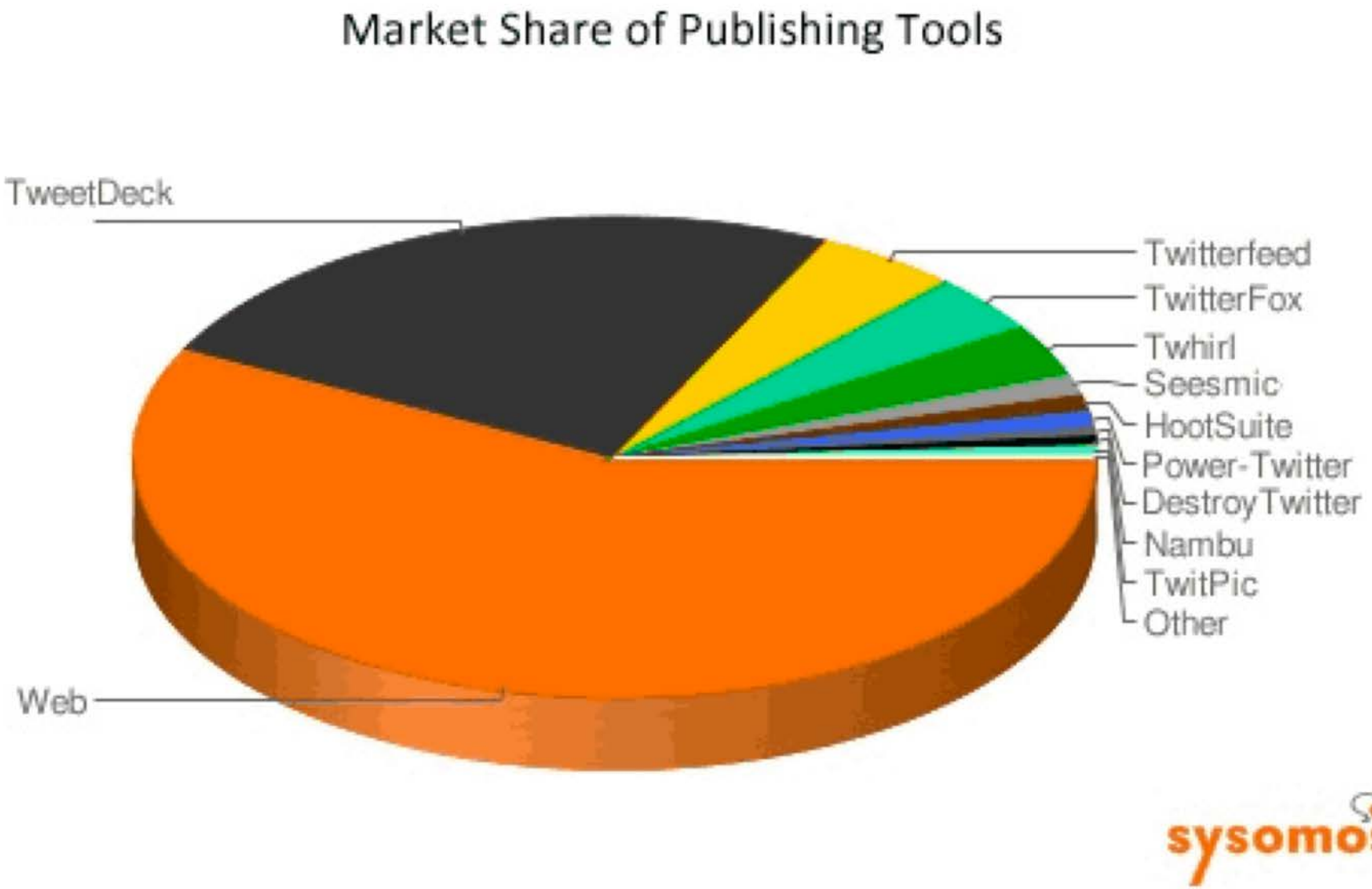
Teams

Data & Communication

1. Know Your Audience







https://dubiousdata.wordpress.com/2014/04/14/death-pie-charts/

Complex

Simple

Computation at Scale

Cognition

Calculation

Instinct

Binary Processing

Pattern Recognition

Whose instincts are we considering?

Think – Pair – Share

Think about your audience:

- What level of technical detail do they need?
- What do **they** want to do with the data?
- What do **you** want them to do with the data?
- What are some gaps in the way you currently communicate data?

Pair up with someone. Discuss your reflections.

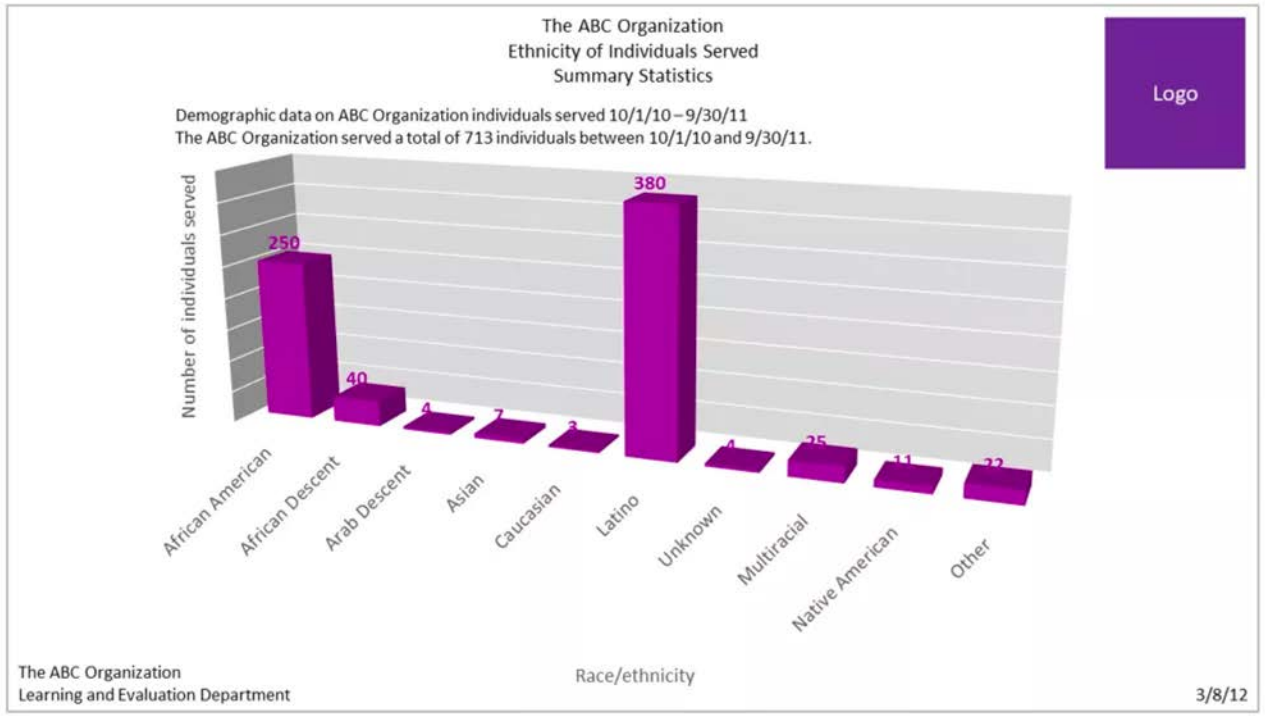
Share with the larger group – if you wish.

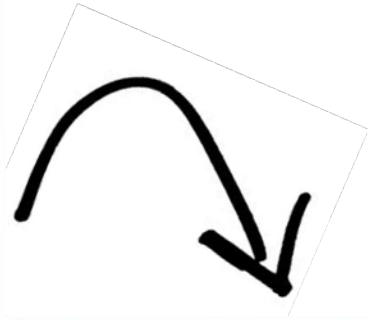
2. Apply Data Visualization Best Practices

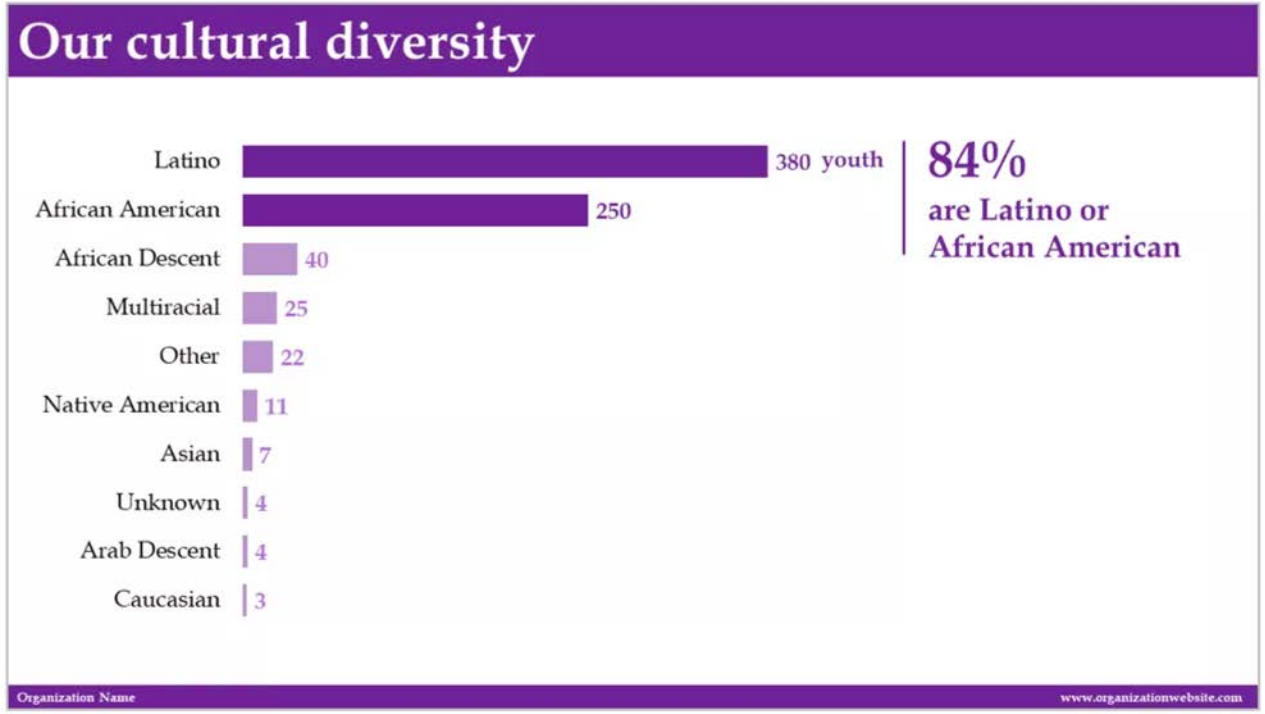
Text

- Titles are descriptive
- Subtitles/annotations provide additional information
- Text size is hierarchical
- Text is horizontal
- Data are labeled directly
- Labels are used sparingly

http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf





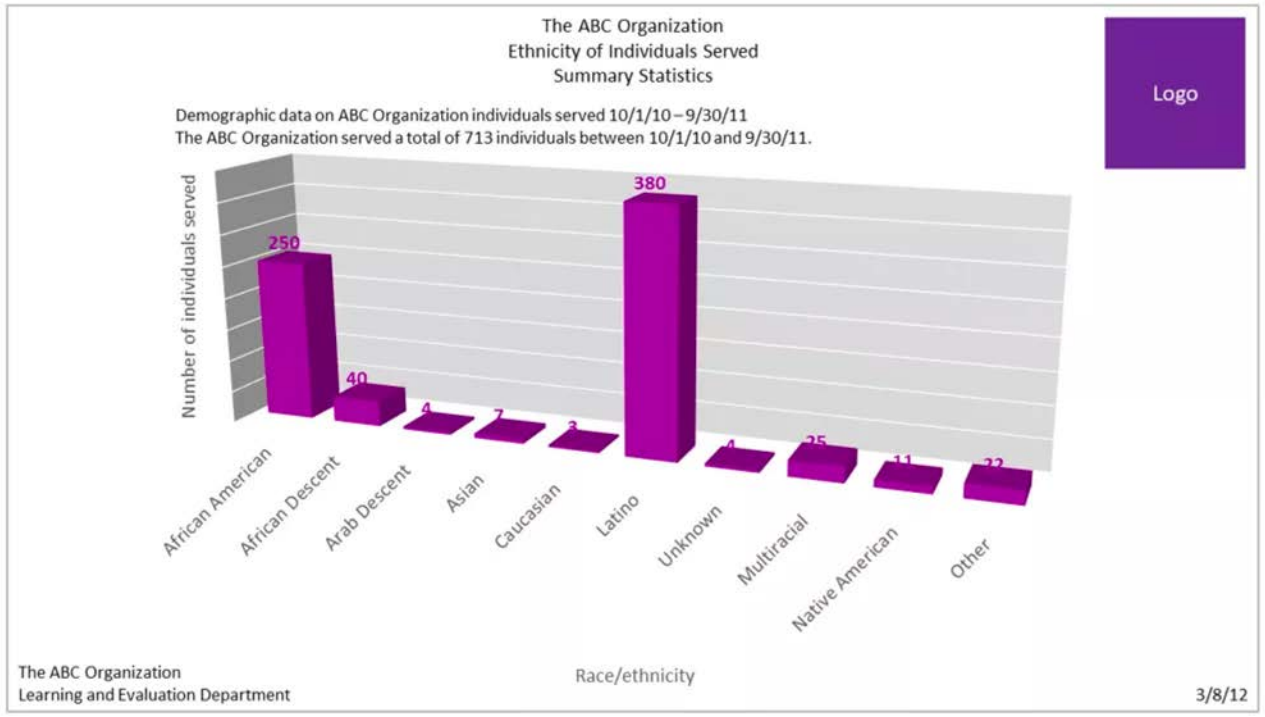


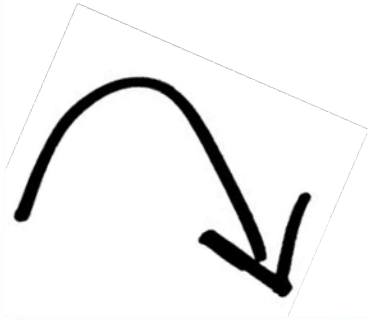
http://annkemery.com/makeovers

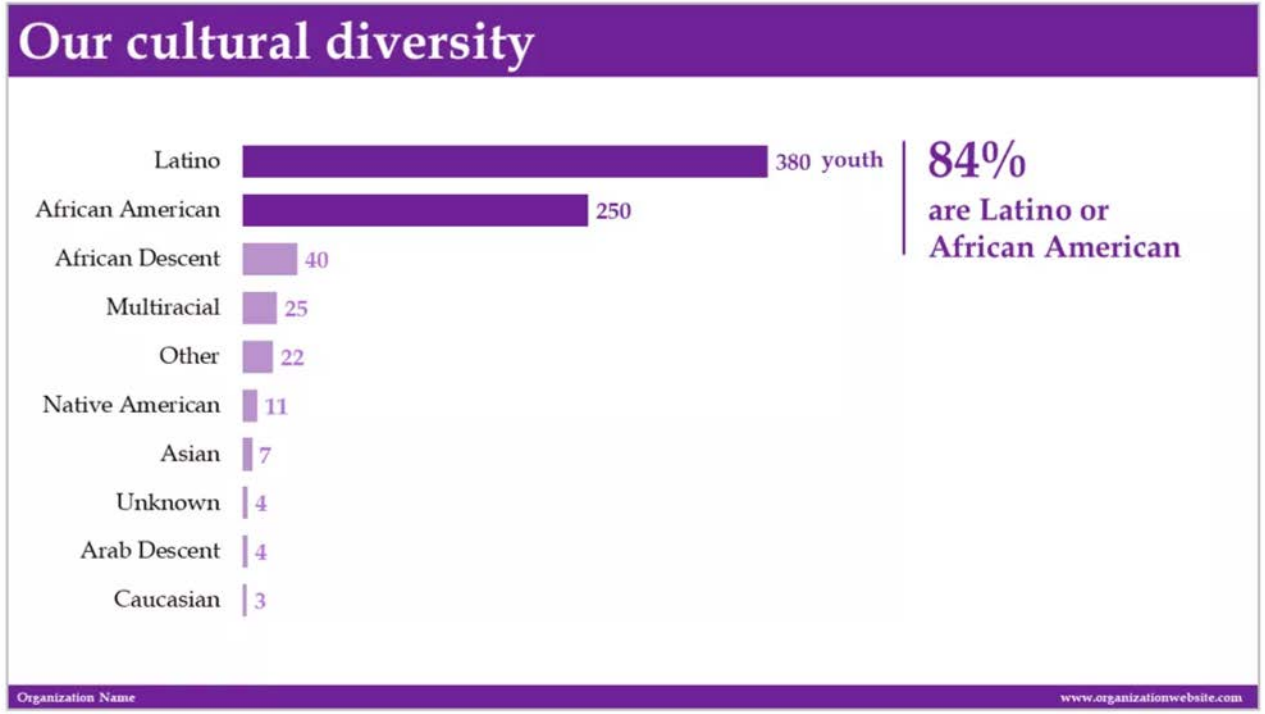
Arrangement

- Proportions are accurate
- Data are intentionally ordered
- Axis intervals are equidistant
- Graph is 2-dimensional
- Display is free from decoration

http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf





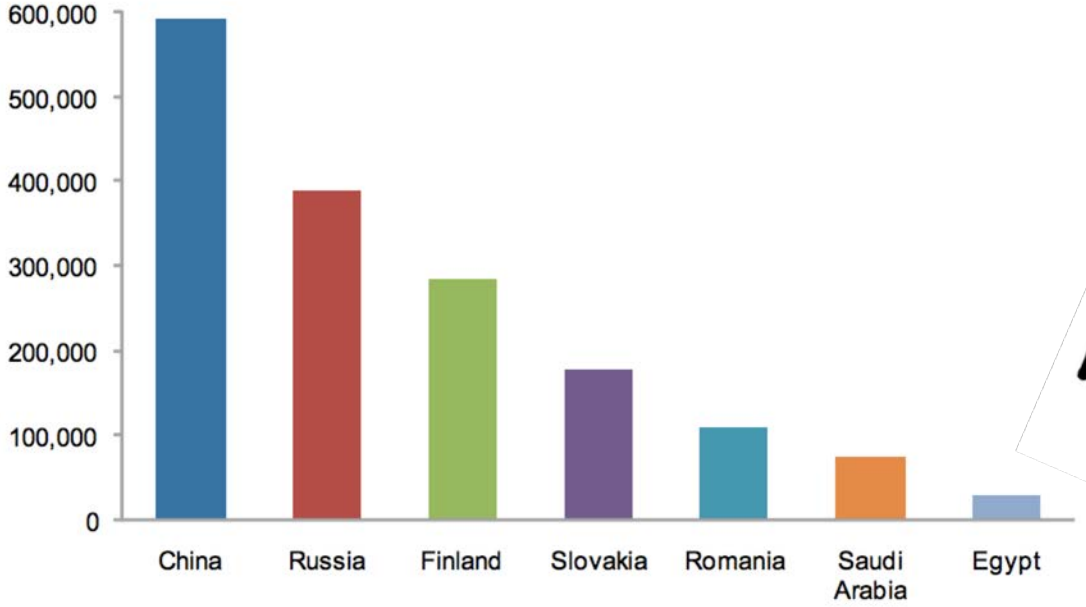


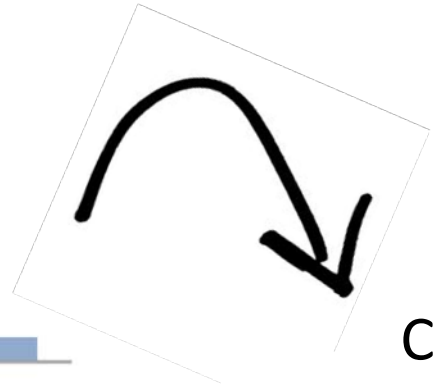
http://annkemery.com/makeovers

Color

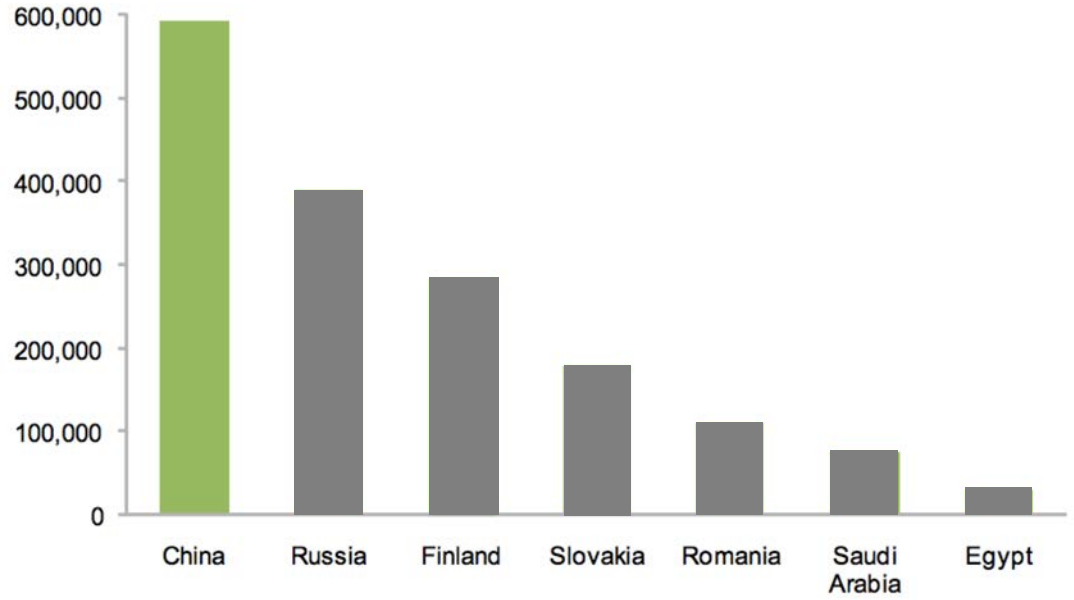
- Color scheme is intentional
- Color is used to highlight key patterns
- Color is legible when printed in black and white
- Color is legible for people with colorblindness
- Text sufficiently contrasts with background

http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf





China has the highest first quarter sales.

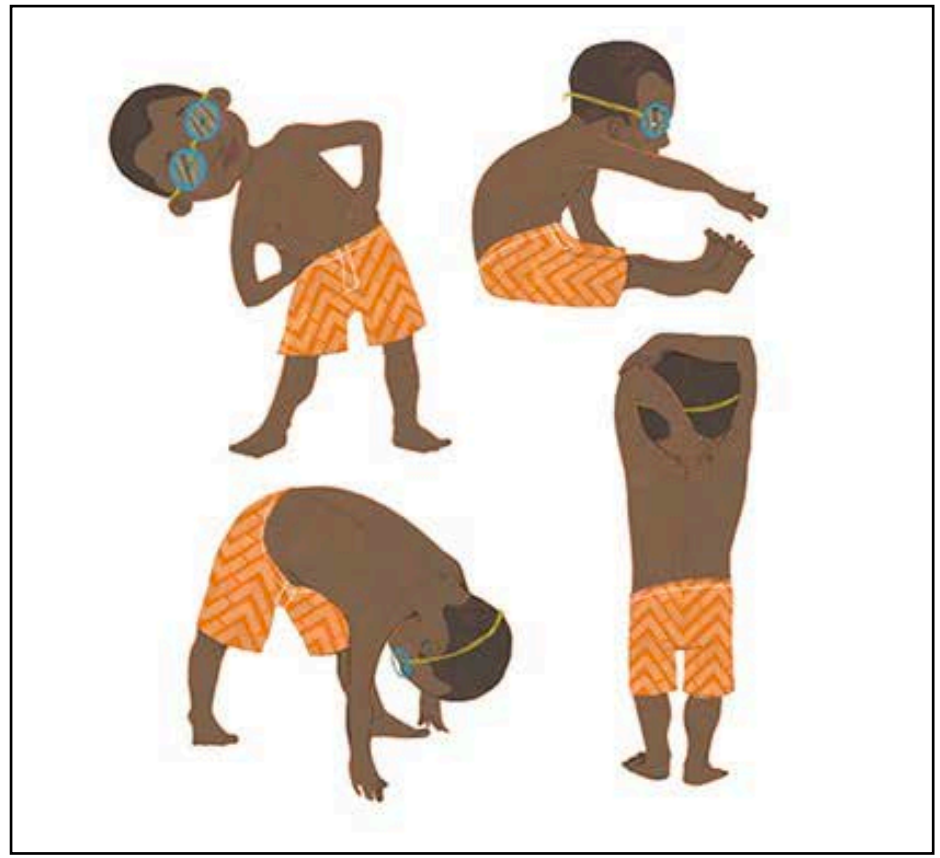


Lines

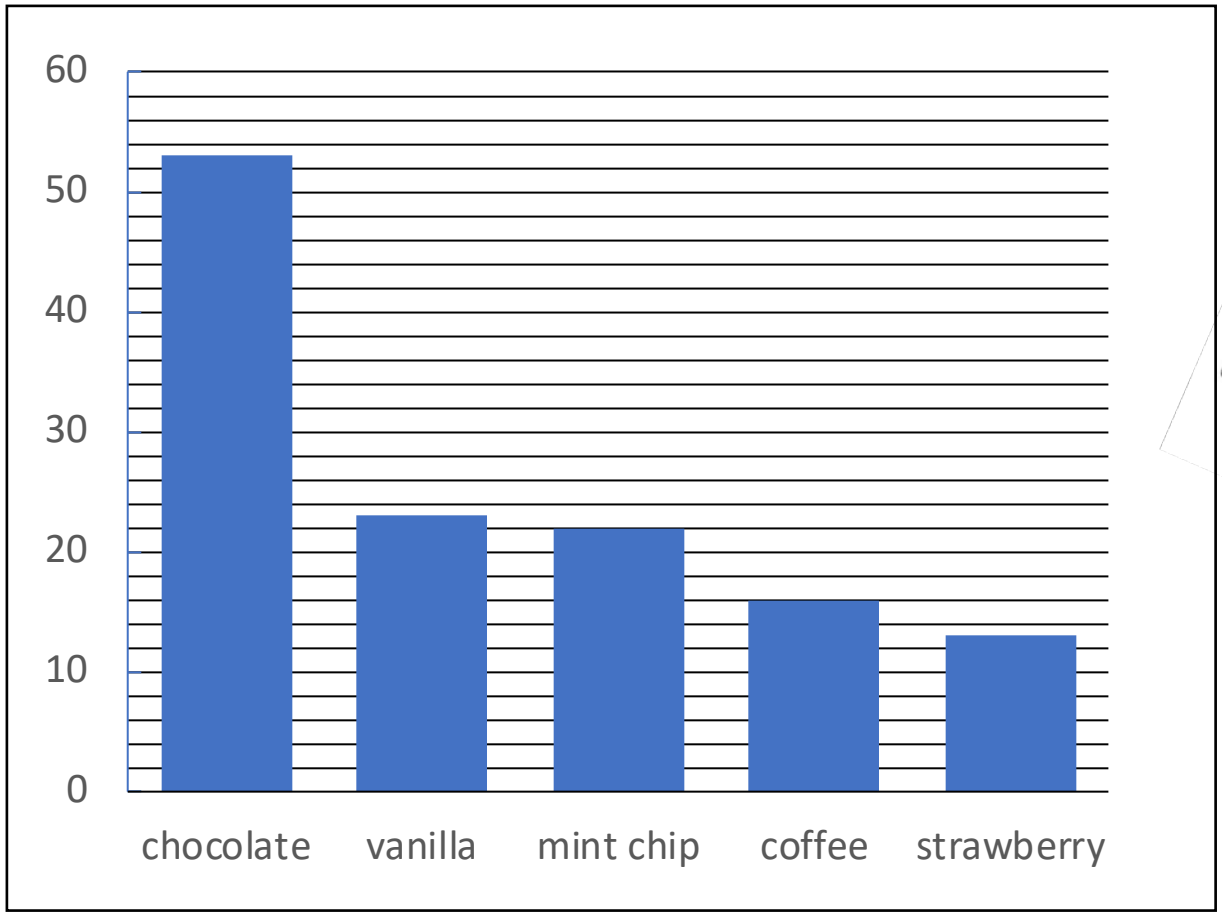
- Gridlines, if present, are muted
- No border lines
- No tick marks, axis lines
- One horizontal, one vertical axis

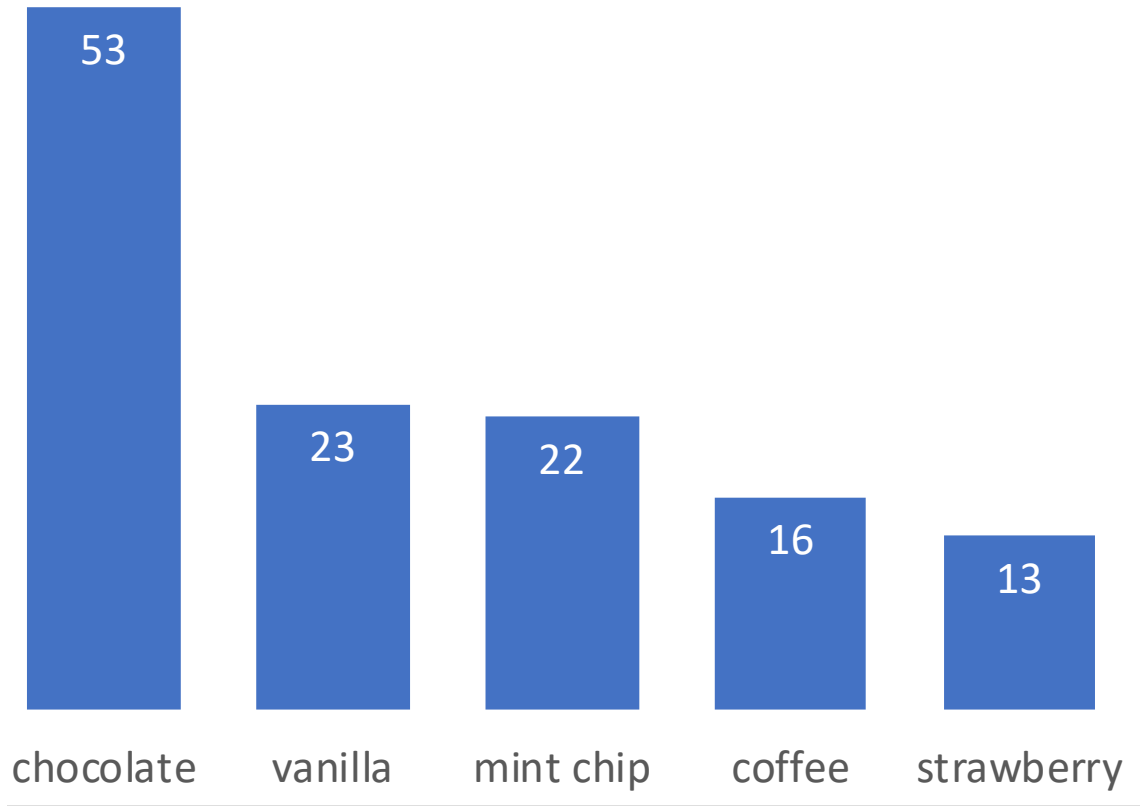
http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf

When he got to the bottom, Jabari remembered something.
"I forgot to do my stretches!" he said to his dad.



"Stretching is very important," said his dad.


60
50
40
30
20
10
0
chocolate
vanilla
mint chip
coffee
strawberry


53
23
22
16
13
chocolate
vanilla
mint chip
coffee
strawberry

General Considerations

- Highlight significant findings or conclusions
- Graph type is appropriate for data
- Graph has appropriate level of precision
- Chart elements work together to create meaning

http://stephanieevergreen.com/wp-content/uploads/2016/10/DataVizChecklist_May2016.pdf

“

Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away.

– *Antoine de Saint-Exupery*

”

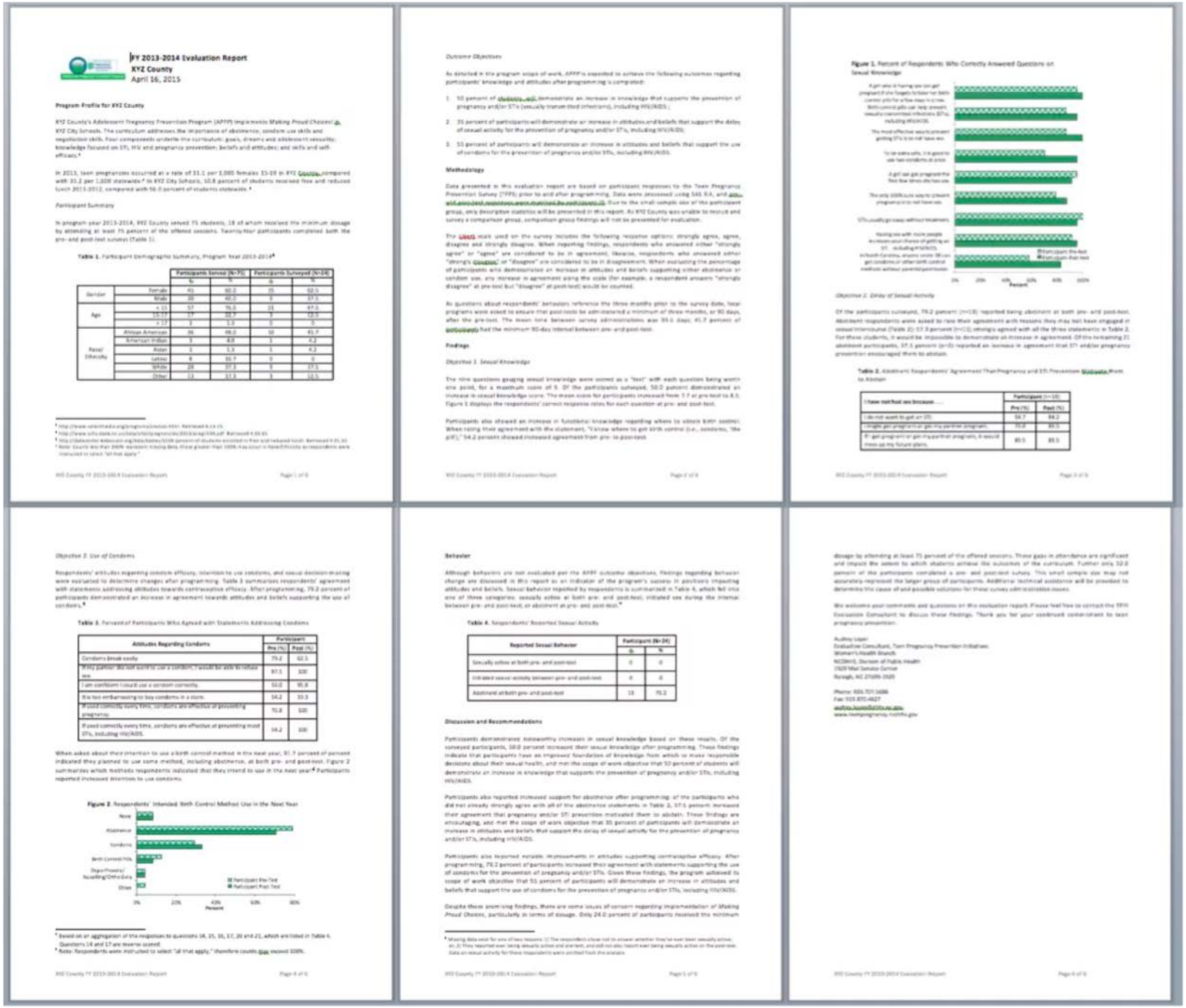
Remove

to improve

(the **data-ink** ratio)

3. Case Studies

Exhibit A.
The Disaster



FY 2013-2014 Evaluation Report
XYZ County
April 16, 2015

Program Profile for XYZ County

Outcome Objectives

Methodology

Findings

Figure 1. Percent of Respondents Who Correctly Answered Questions on Sexual Knowledge

Objective 2. Delay of Sexual Activity

Table 2. Abstinent Respondents' Agreement That Pregnancy and STI Prevention Motivate Them to Abstain

Objective 3. Use of Condoms

Figure 2. Respondents' Intended Birth Control Method Use in the Next Year

Behavior

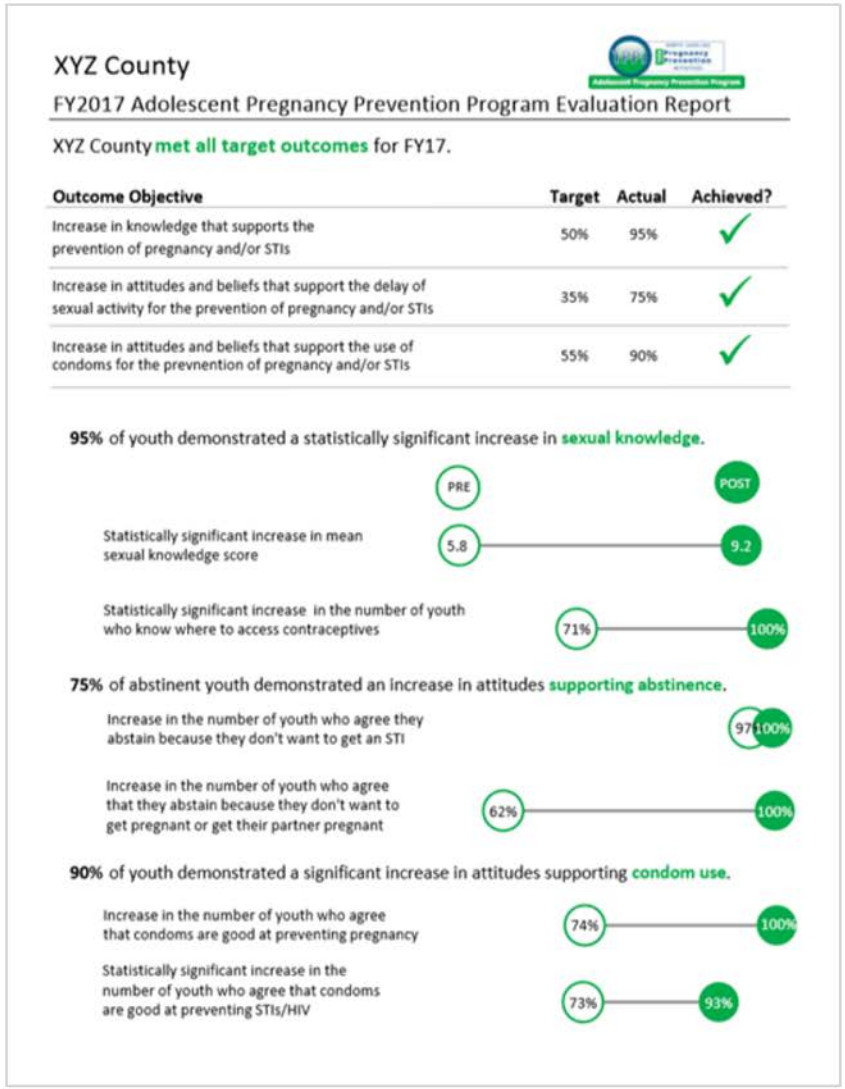
Table 4. Respondents' Reported Sexual Activity

Discussion and Recommendations

The Reboot Agenda

1. Don’t bury the lead
2. Limit to one page (front and back)
3. No blocks of narrative text
4. Use color for emphasis

Exhibit B. The Improvement



XYZ County

FY2017 Adolescent Pregnancy Prevention Program Evaluation Report

XYZ County **met all target outcomes** for FY17.

Outcome Objective	Target	Actual	Achieved?
Increase in knowledge that supports the prevention of pregnancy and/or STIs	50%	95%	✓
Increase in attitudes and beliefs that support the delay of sexual activity for the prevention of pregnancy and/or STIs	35%	75%	✓
Increase in attitudes and beliefs that support the use of condoms for the prevnention of pregnancy and/or STIs	55%	90%	✓

95% of youth demonstrated a statistically significant increase in **sexual knowledge.**

Statistically significant increase in mean sexual knowledge score: PRE 5.8 → POST 9.2

Statistically significant increase in the number of youth who know where to access contraceptives: 71% → 100%

75% of abstinent youth demonstrated an increase in attitudes **supporting abstinence.**

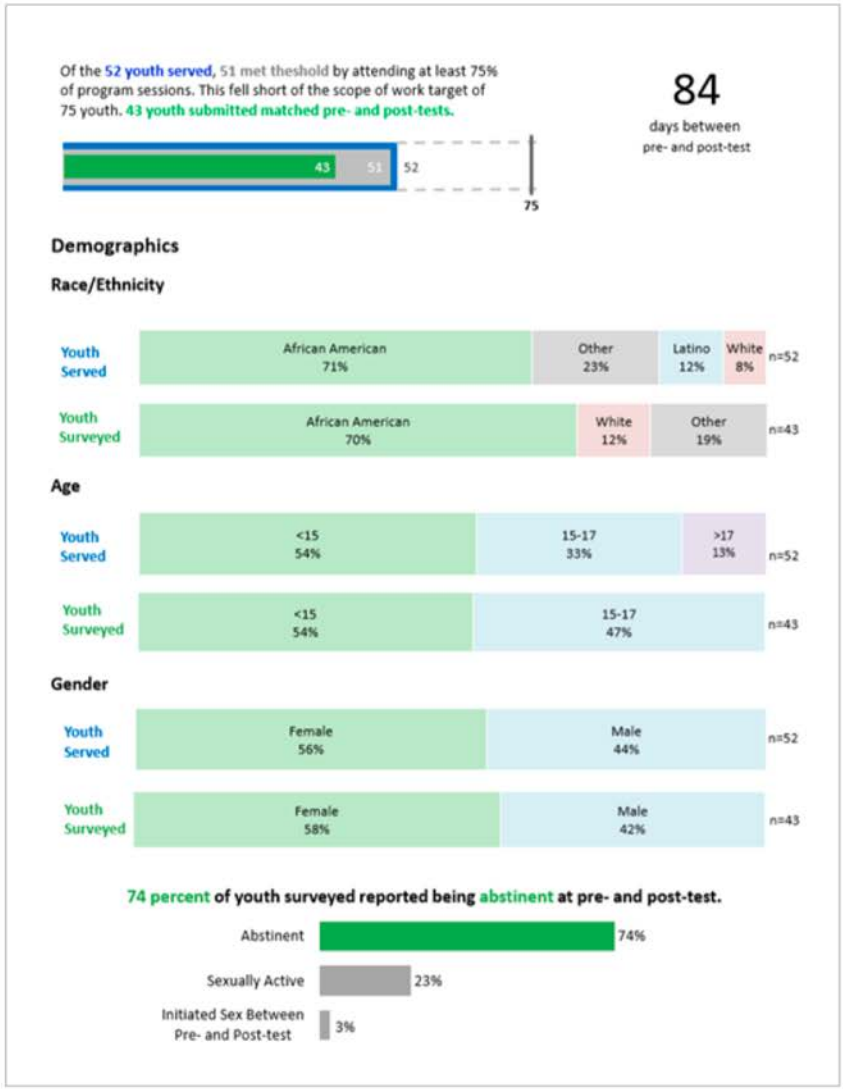
Increase in the number of youth who agree they abstain because they don't want to get an STI: 97% → 100%

Increase in the number of youth who agree that they abstain because they don't want to get pregnant or get their partner pregnant: 62% → 100%

90% of youth demonstrated a significant increase in attitudes supporting **condom use.**

Increase in the number of youth who agree that condoms are good at preventing pregnancy: 74% → 100%

Statistically significant increase in the number of youth who agree that condoms are good at preventing STIs/HIV: 73% → 93%



Of the **52 youth served,** 51 met theshold by attending at least 75% of program sessions. This fell short of the scope of work target of 75 youth. **43 youth submitted matched pre- and post-tests.**

43 | 51 | 52 | 75

84 days between pre- and post-test

Demographics

Race/Ethnicity

Youth Served	African American 71%	Other 23%	Latino 12%	White 8%	n=52
Youth Surveyed	African American 70%	White 12%	Other 19%		n=43

Age

Youth Served	<15 54%	15-17 33%	>17 13%	n=52
Youth Surveyed	<15 54%	15-17 47%		n=43

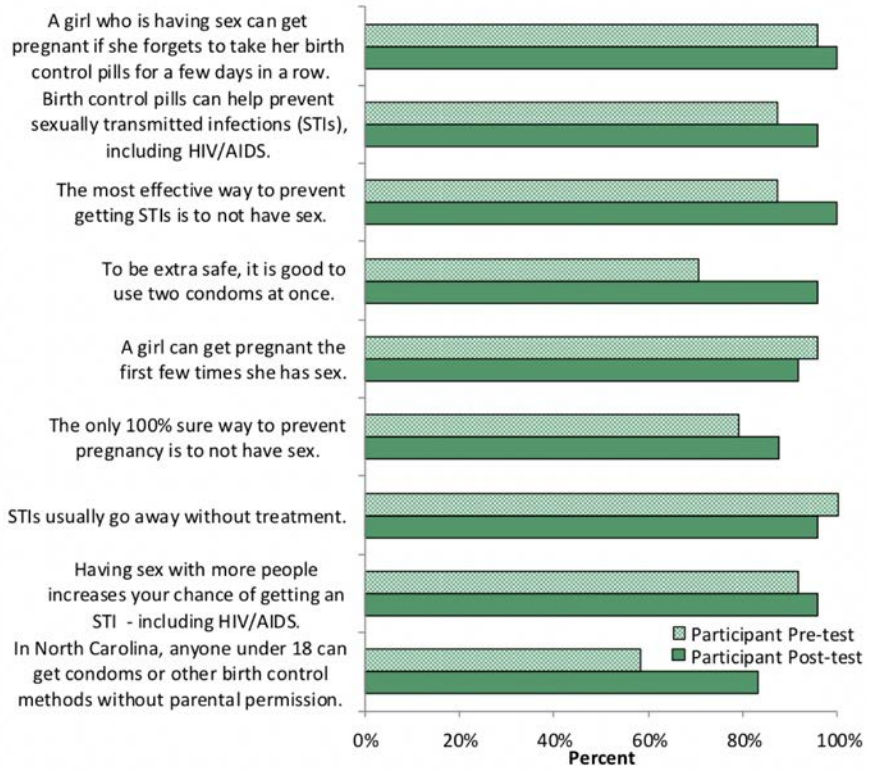
Gender

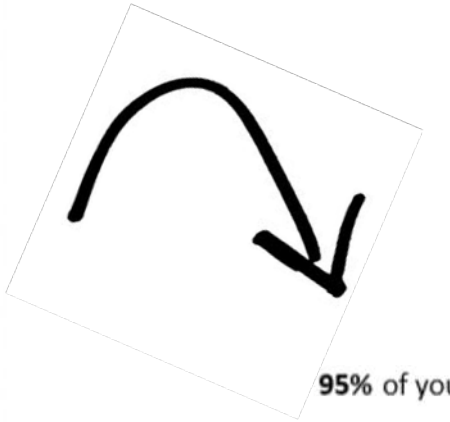
Youth Served	Female 56%	Male 44%	n=52
Youth Surveyed	Female 58%	Male 42%	n=43

74 percent of youth surveyed reported being abstinent at pre- and post-test.

Abstinent	74%
Sexually Active	23%
Initiated Sex Between Pre- and Post-test	3%

Figure 1. Percent of Respondents Who Correctly Answered Questions on Sexual Knowledge





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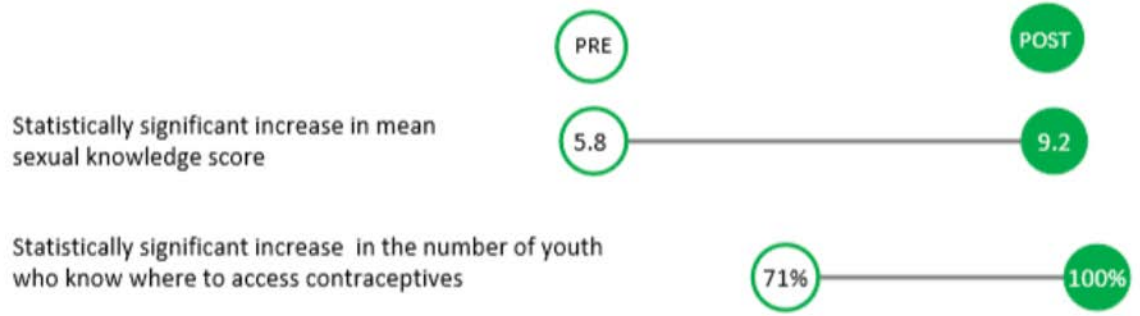


75% of abstinent youth demonstrated an increase in attitudes **supporting abstinence**.

90% of youth demonstrated a significant increase in attitudes supporting **condom use**.

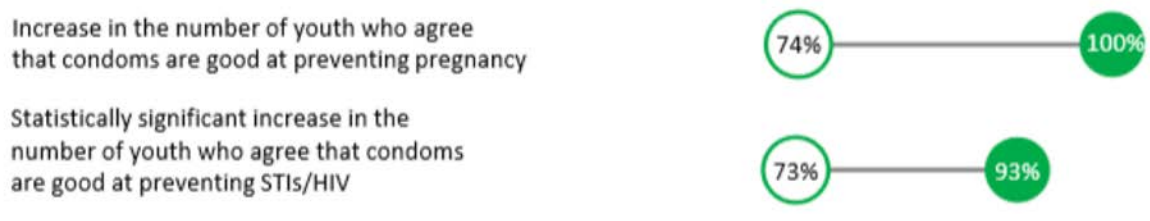


Exhibit C. The Unnecessarily Dense Approach

Assessment Results - May 2017

Generalist Accreditation Assessment

Response Rate: 100%

Table 1. Generalist Assessment Results (*N* = 107)

	Mean Score	*SD*	Lowest Score Recorded	Highest Score Recorded	Average Percentage of Correct Responses[c]	Students who scored at least 80% (out of 107)[d] n	%
Total[a]	38.67	3.06	29	44	85.93	93	86.92%
By Competency							
Competency 1 (Ethics)[b]	4.36	0.69	2	5	87.20	98	91.59%
Competency 2 (Diversity)	4.57	0.69	2	5	91.40	97	90.65%
Competency 3 (Social Justice)	3.95	0.95	1	5	79.00	78	72.90%
Competency 4 (Research/Practice)	3.95	0.93	2	5	79.00	78	72.90%
Competency 5 (Policy)	4.02	0.84	2	5	80.40	80	74.77%
Competency 6 (Engagement)	4.61	0.59	3	5	92.20	101	94.39%
Competency 7 (Assessment)	3.89	0.92	1	5	77.80	77	71.96%
Competency 8 (Intervention)	4.38	0.78	2	5	87.60	93	86.92%
Competency 9 (Evaluation)	4.45	0.71	2	5	89.00	95	88.79%

	n	%
Year of Study		
First Year	107	100.00%
Final Year	0	0.00%
Student Status		
Chapel Hill, Full-Time	66	61.68%
Chapel Hill, Advanced Standing	0	0.00%
DE - Triangle	26	24.30%
DE - Winston-Salem	15	14.02%

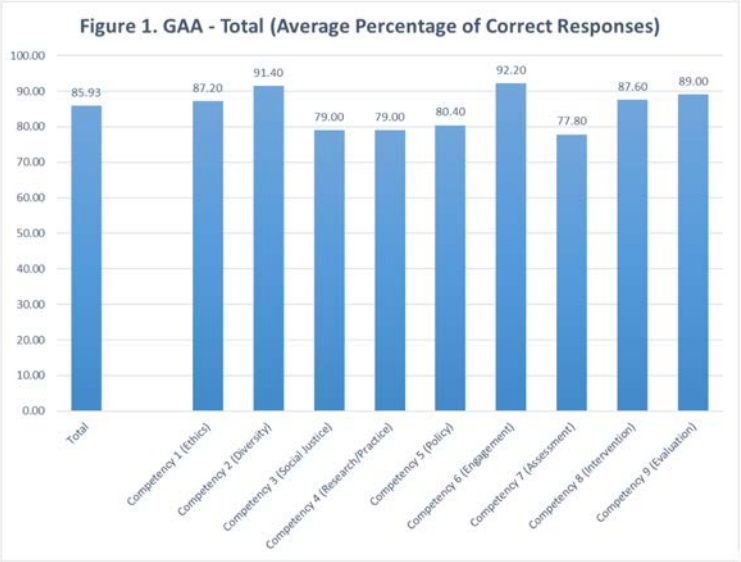
Note: Each student was randomly allocated 5 items per competency from an item pool. The following are item-pool counts for each competency; Competency 1: 19 items, Competency 2: 16 items, Competency 3: 10 items, Competency 4: 17 items, Competency 5: 16 items, Competency 6: 17 items, Competency 7: 34 items, Competency 8: 14 items, Competency 9: 7 items. *SD* = standard deviation.

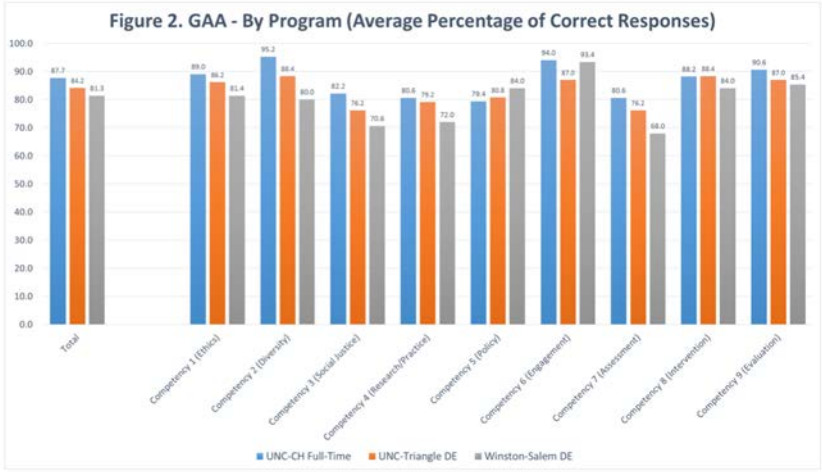
[a]The minimum possible total score is 0, and the maximum possible total score is 45.

[b]The minimum possible score for each competency is 0, and the maximum possible score for each competency is 5.

[c]This column represents the average percentage of correct responses, in total and across competencies (i.e., mean score / total score x 100; e.g., 38.67 / 45 x 100 = 85.93%)

[d]The focal performance benchmark was that at least 85% of students would score 80% or higher, in total and across competencies. Thus, student percentages highlighted in green indicate the benchmark was met, whereas student percentages in red font indicate the benchmark was not met.





The Reboot Agenda

1. Refocus visuals to highlight key take-aways
2. Remove superfluous data
3. Simplify color scheme

Exhibit D. The Simplification

1

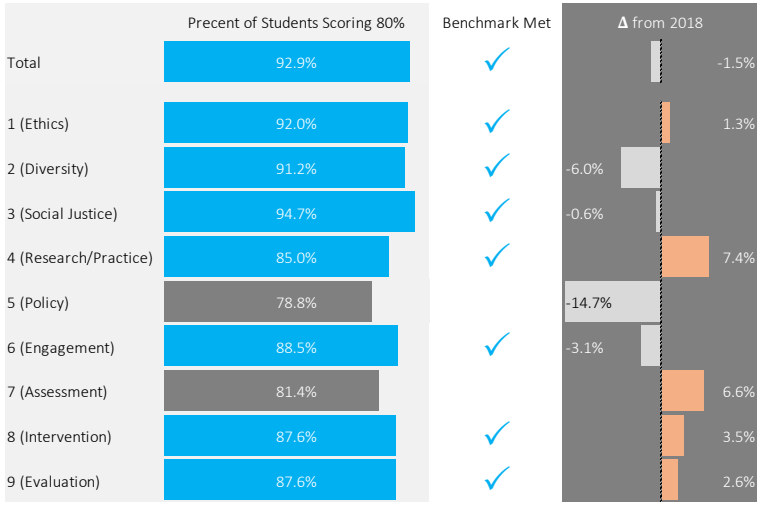
Generalist Results – May 2019

Student Overview and Benchmarks

This section of the report overviews student statuses, benchmark results, and change from the 2018 Generalist Outcome Assessment.

113 First-Year Students

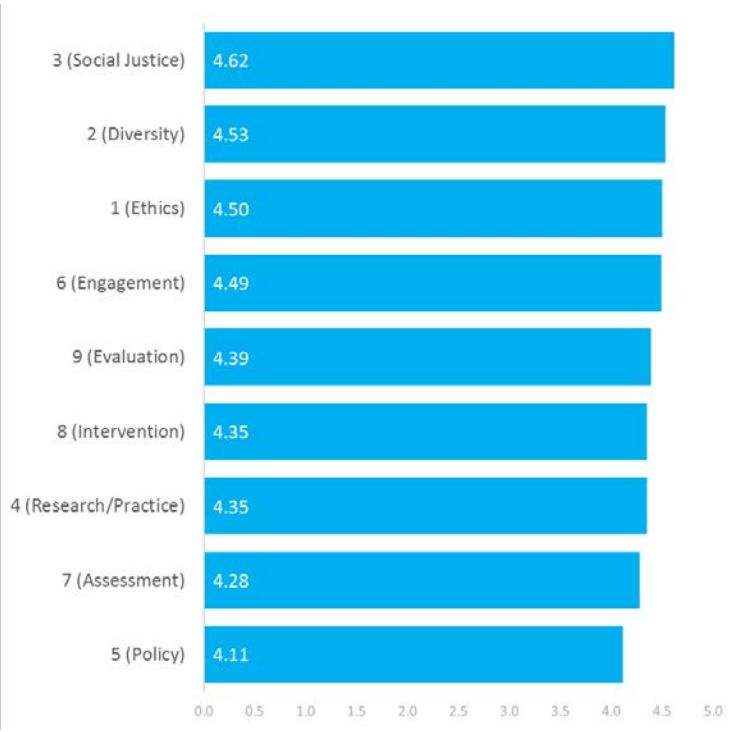
Full-Time	71	63%
DE - Triangle	25	22%
DE - Winston-Salem	17	15%
Advanced Standing	0	0%

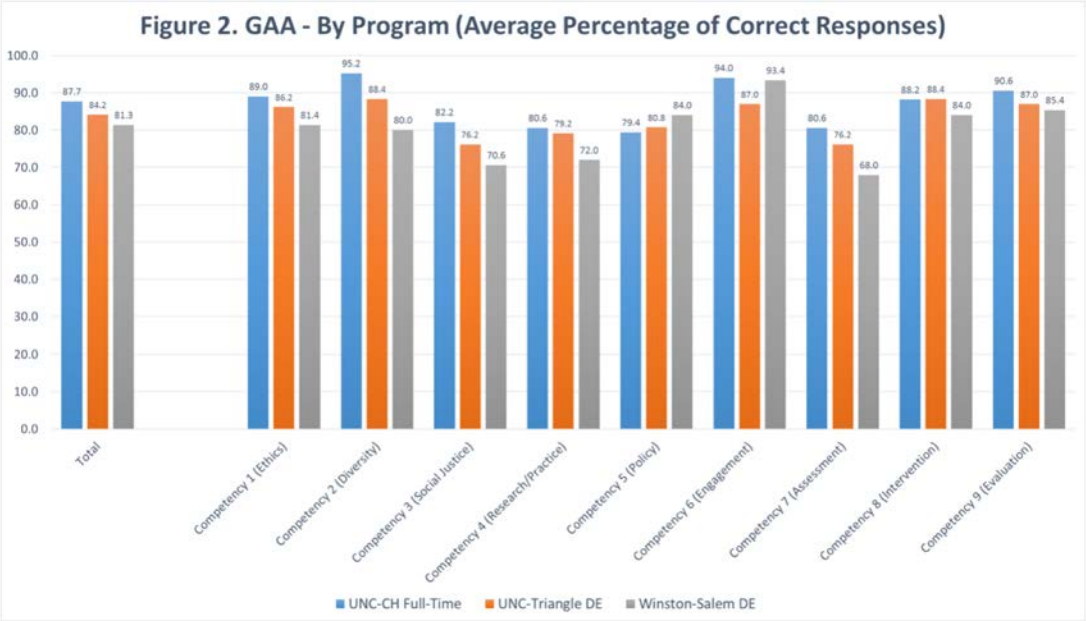


2

Average Scores by Competency

This section of the report shows average scores for each competency across all first-year students (possible scores range from 0 to 5). Average scores are sorted from largest to smallest.





Average Scores by Student Status

This section of the report shows averages scores for each competency, and in total, by student status.

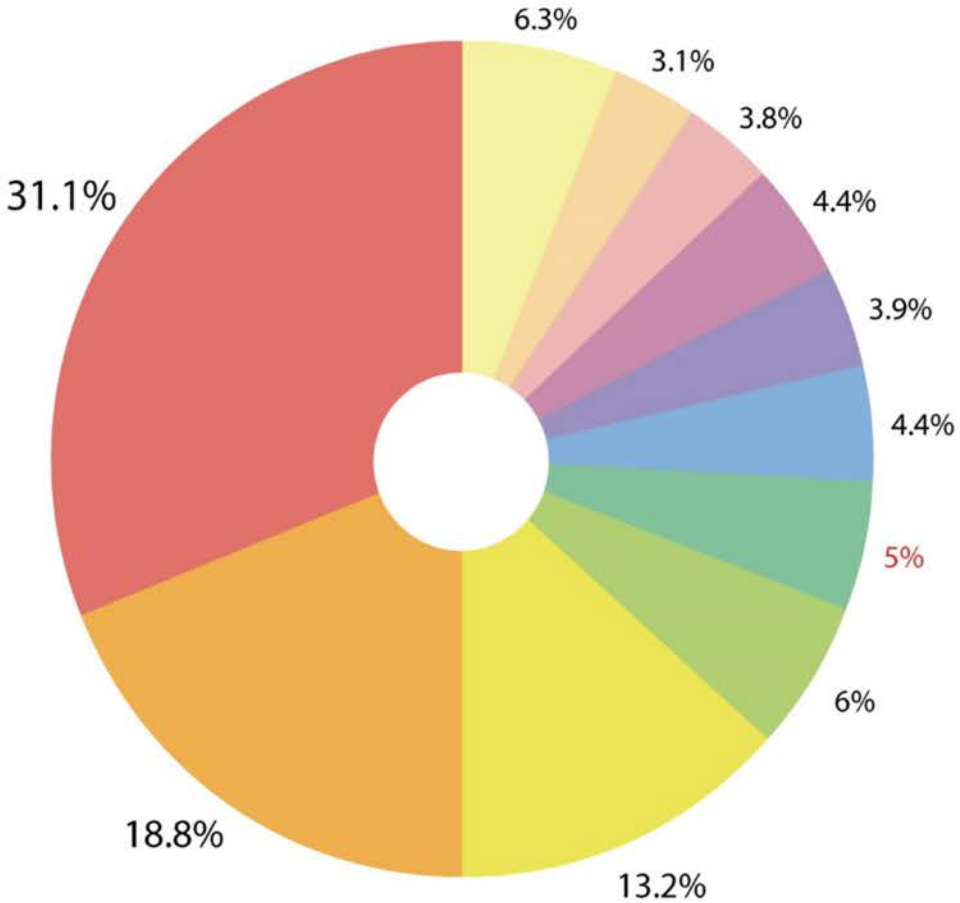
	Full-Time	DE - Triangle	DE - Winston Salem
Total	40.35	39.36	38.88
1 (Ethics)	4.48	4.56	4.53
2 (Diversity)	4.63	4.40	4.29
3 (Social Justice)	4.58	4.80	4.53
4 (Research/Practice)	4.35	4.40	4.29
5 (Policy)	4.17	3.92	4.12
6 (Engagement)	4.48	4.52	4.47
7 (Assessment)	4.45	3.96	4.06
8 (Intervention)	4.39	4.28	4.29
9 (Evaluation)	4.48	4.40	4.00

Data Gallery

Visit each data visualization flipchart. Using the Data Viz Checklist note:

- Strengths
- Opportunities for improvement
- Questions you may have

United Kingdom 2016-17 Government Expenditure

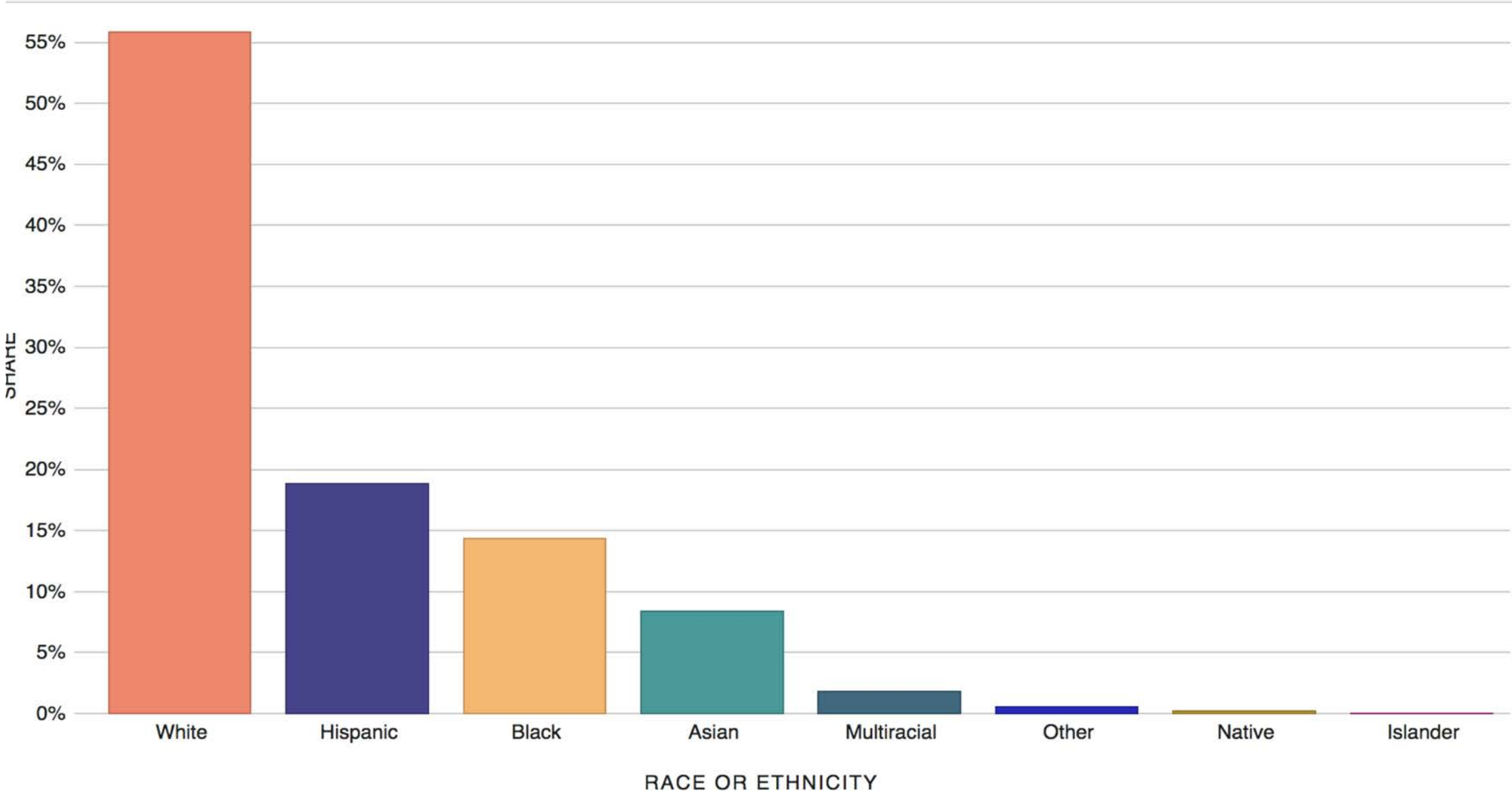


- Social Protection - £240bn
- Health - £145bn
- Education - £102bn
- Defence - £46bn
- Government Debt Interest - £39bn
- Public Order and Safety - £34bn
- Personal Social Services - £30bn
- Housing and Environment - £34bn
- Transport - £29bn
- Industry, agriculture and employment - £24bn
- Other (includes EU contributions) - £49bn

Expenditure figures taken from page 5, *Budget 2016*. 16 March 2016, HM Govt

Total 2016-17 Government Expenditure: £772 billion

https://upload.wikimedia.org/wikipedia/commons/3/37/UK-Government-Expenditure-2016-17.jpg



https://upload.wikimedia.org/wikipedia/commons/2/2a/Bar_Chart_of_Race_%26_Ethnicity_in_New_York_%282015%29.svg

Anatomy of a Winning TED Talk

1%
Sophisticated Visual Aids

We're not sure who puts the D in TED—most of the best presentations favor tepid PowerPoint slide shows (sorry, Brené Brown), Pictionary-quality drawings (really, Simon Sinek?), or no props at all.

5%
Opening Joke

Remember the one about the shoe salesmen who went to Africa in the 1900s? That's how Benjamin Zander opened his talk—which turned out to be about classical music.

5%
Spontaneous Moment

Don't overprepare. Tease the guy in the front row ("You could light up a village with this guy's eyes"). Commend the stagehand who handles the human brain you brought.

5%
Statement of Utter Certainty

People come for answers—give 'em what they want, as Shawn Achor did: "By training your brain … we can reverse the formula for happiness and success."

12%
Snappy Refrain

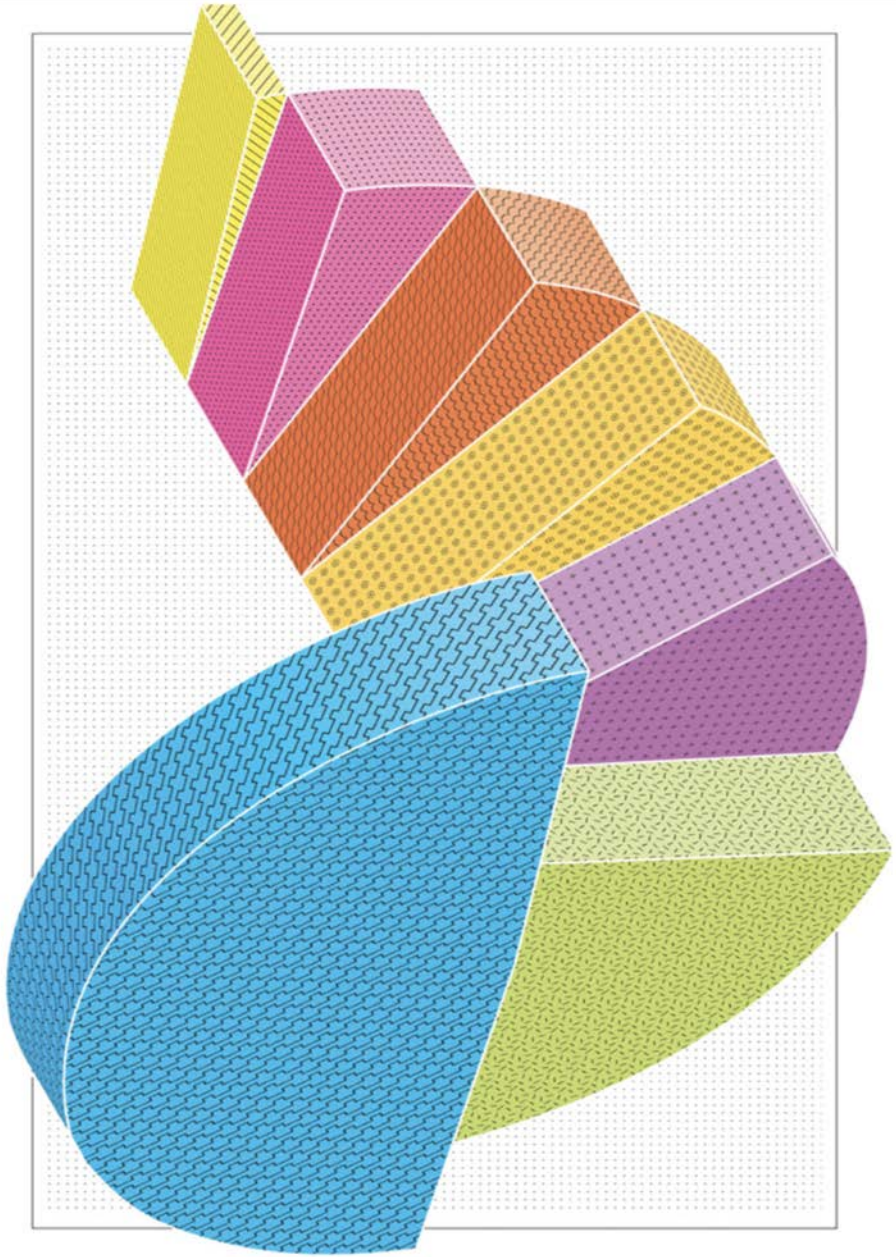
The TED equivalent of "I have a dream." Example: "People don't buy what you do; they buy why you do it." Repeat 7x.

23%
Personal Failure

Be relatable.We want to know about that nervous breakdown. Or at least the time you didn't fit in at summer camp.

49%
Contrarian Thesis

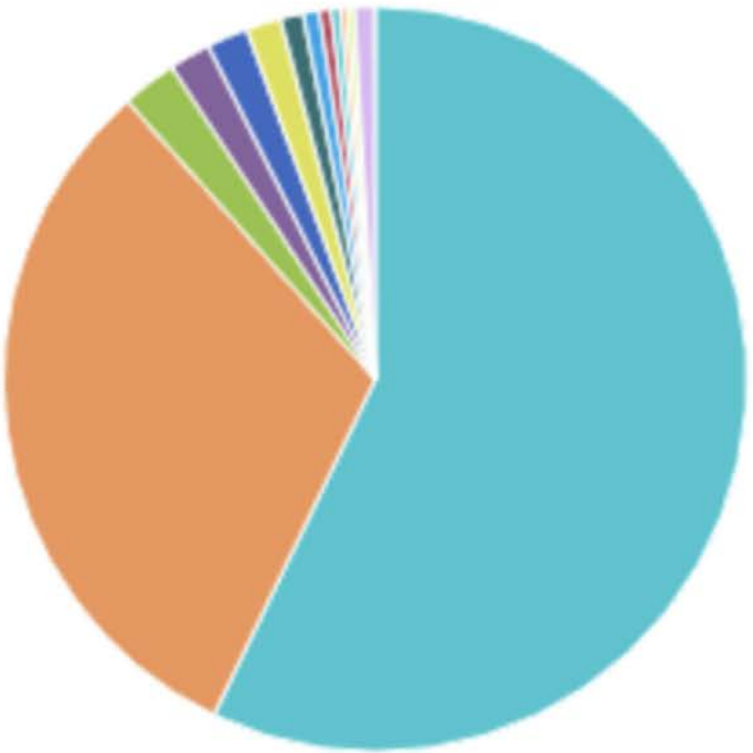
Wait a sec—we should be playing *more* videogames? The more choices we have, the worse off we are? TED is where conventional wisdom goes to die.



http://i.imgur.com/z4f7BUF.png

LANGUAGES

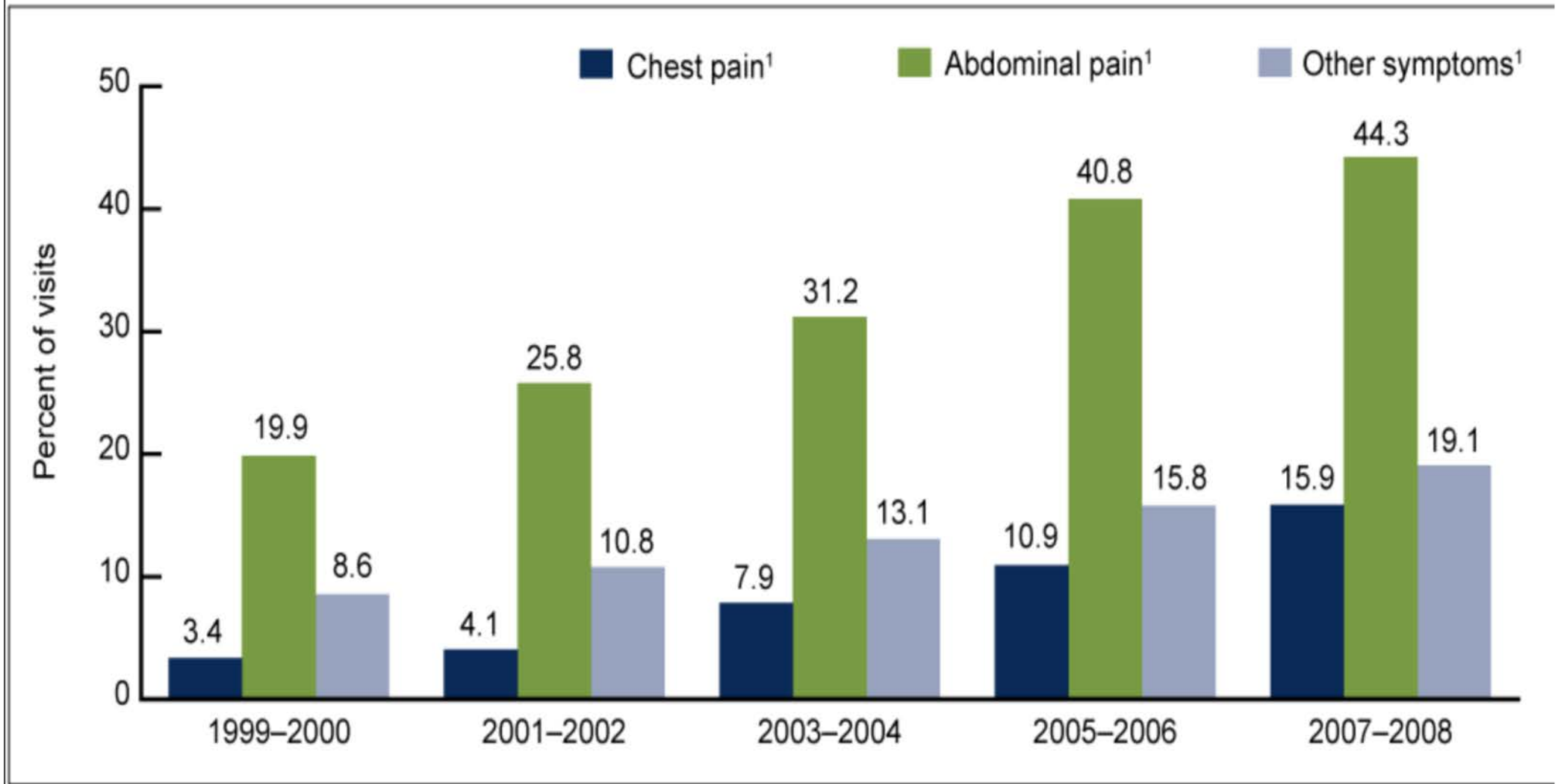
This chart shows you the primary languages of your community, useful when deciding which language to Tweet in.



- English: ~42107 (57.1%)
- Spanish: ~22987 (31.2%)
- Portuguese: ~1798 (2.4%)
- German: ~1362 (1.8%)
- French: ~1355 (1.8%)
- Dutch: ~1070 (1.5%)
- Italian: ~745 (1%)
- Catalan: ~528 (0.7%)
- Turkish: ~369 (0.5%)
- Indonesian: ~271 (0.4%)
- English UK: ~256 (0.3%)
- Russian: ~207 (0.3%)
- Other: ~661 (0.9%)

https://userguide.audiense.com/wp-content/uploads/2012/11/2-pie-chart.png

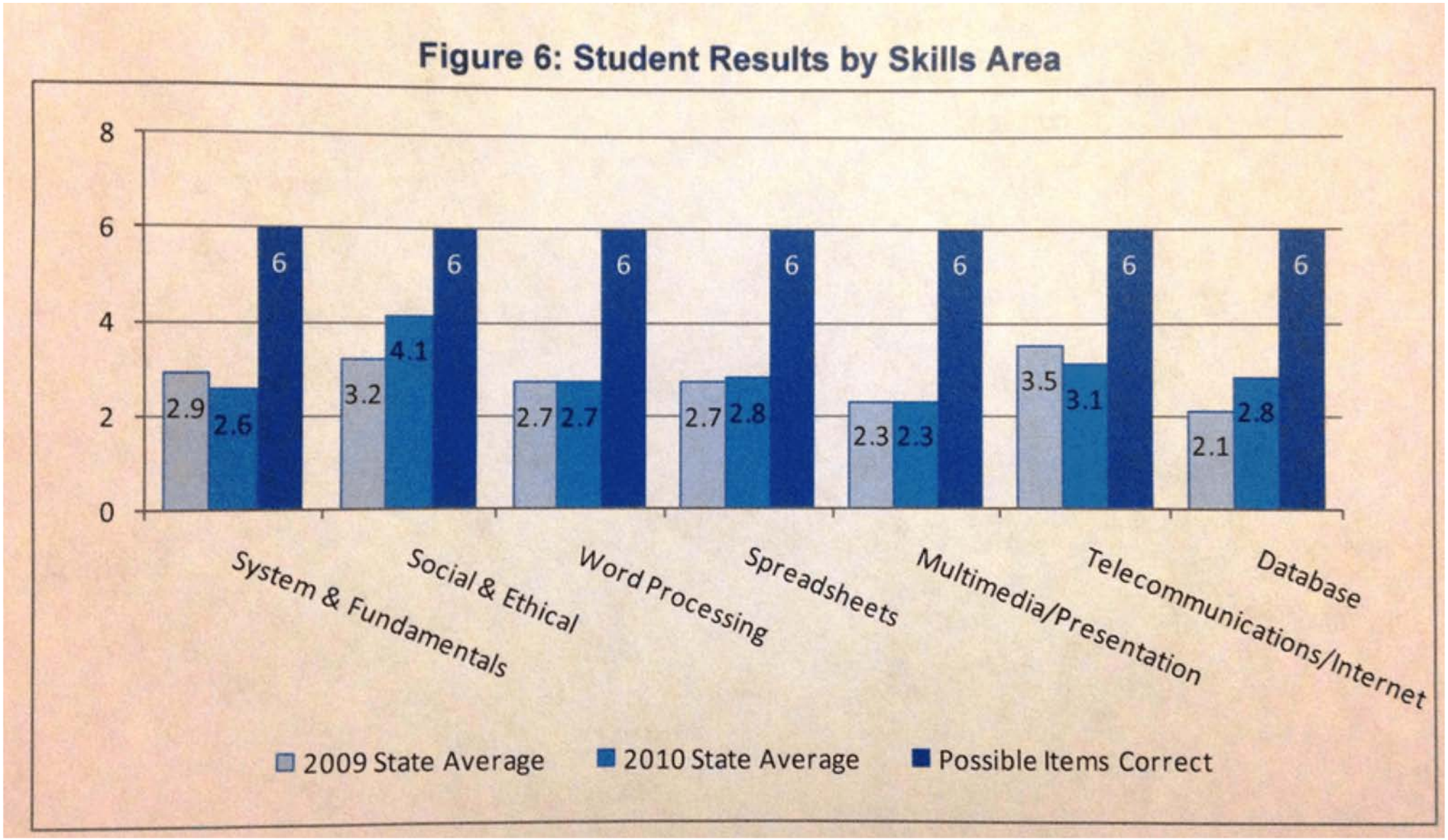
Figure 4. Advanced medical imaging among noninjury emergency department visits for persons aged 18 years and over: United States, 1999–2008



[1]Trend is significant ($p < 0.05$).
NOTE: Figures are based on 2-year averages.
SOURCE: CDC/NCHS, National Hospital Ambulatory Medical Care Survey, 1999–2008.

https://upload.wikimedia.org/wikipedia/commons/5/56/Advanced_medical_imaging_during_noninjury_ED_visits.png

Figure 6: Student Results by Skills Area



Action Planning

Where do you have discretion and freedom to act?

What can you do without more resources or authority?

Questions?

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