Organizational Data Literacy and Change

February 7, 11:30 a.m.–12:30 p.m.

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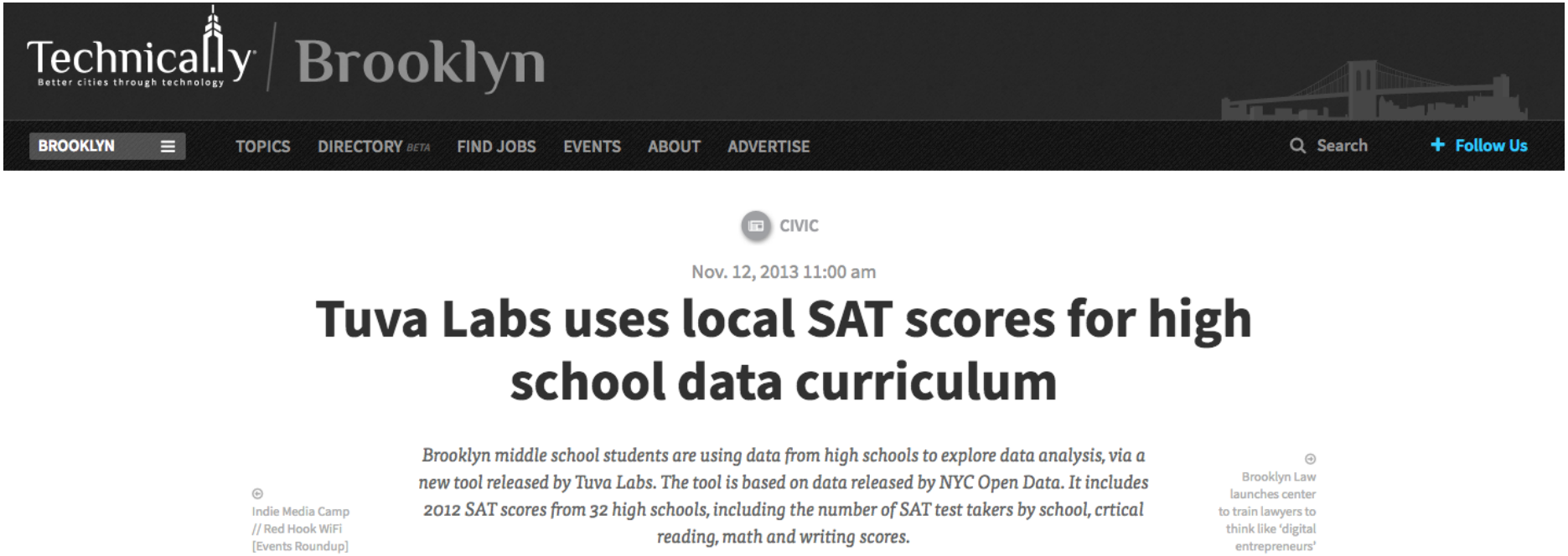
Agenda for the next hour before lunch…

- Introduction
- Data literacy in two unlikely places
- A group quiz
- The need for data literacy – an example
- What does this mean for your organization?
- Questions and Discussion

A bit about Tuva

- Empowering teachers to build data literacy in classrooms
    - 8500+ schools in 90+ countries, 150+ colleges of education
- Data literacy programs for enterprises
    - Technology, talent, and training
- Data literacy and statistical capacity building for sustainable development (Africa, India)
- Working at the intersection of technology, pedagogy, learning science, curriculum, training, and implementation

Data Literacy in Classrooms



Data Literacy in Classrooms

Sections

The Washington Post

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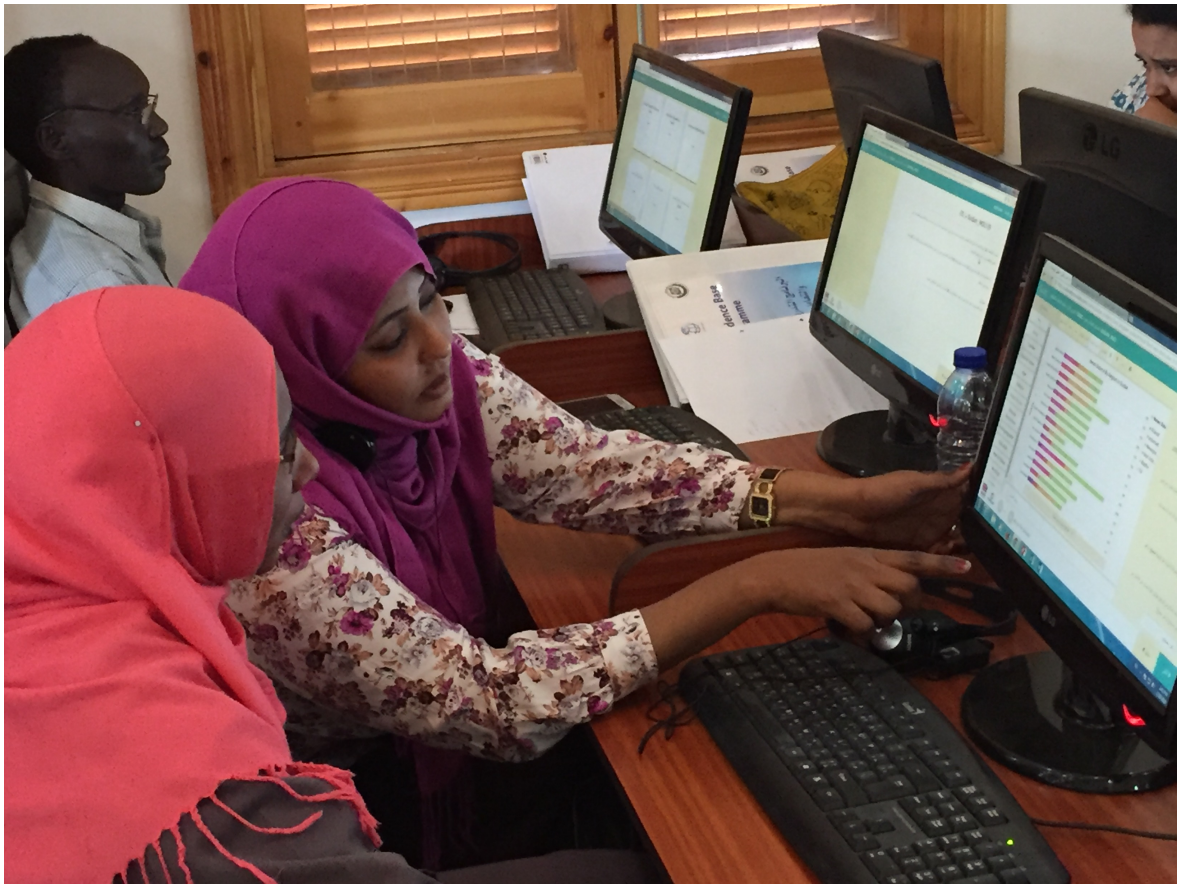
Elementary schools start teaching data literacy

By Mohana Ravindranath November 16, 2014

Elementary school teacher Lisa Parisi is trying to teach her students a new kind of literacy.

By the time fifth-graders enter her class at Denton Avenue School in New Hyde Park, NY., they are about 10 years old and have developed basic reading, writing, and math skills. They are less comfortable, Parisi found, handling data.

Data Literacy for Sustainable Development



Data Literacy for Sustainable Development

Time for a quiz

- Just 2 questions
- Read the table
- Choose the best answer
- Raise your hands

Question 1

Table 1

College students	SEX		
Major	Male	Female	ALL
Business	60%	20%	40%
Economics	10%	50%	30%
MIS	30%	30%	30%
ALL	**100%**	**100%**	**100%**

A. 60% of these college business majors are males

B. 60% of these male college students are business majors

C. 60% of these college students are male business majors

D. 60% of these male business majors are college students

E. More than one of the above

F. None of the above

Answer 1

Table 1

College students	SEX		
Major	Male	Female	ALL
Business	60%	20%	40%
Economics	10%	50%	30%
MIS	30%	30%	30%
ALL	**100%**	**100%**	**100%**

A. 60% of these college business majors are males

B. 60% of these male college students are business majors

C. 60% of these college students are male business majors

D. 60% of these male business majors are college students

E. More than one of the above

F. None of the above

Question 2

Table 2

College students	SEX		
Major	Male	Female	ALL
Business	75%	25%	**100%**
Economics	17%	83%	**100%**
MIS	50%	50%	**100%**
ALL	50%	50%	**100%**

A. 75% of these college business majors are males

B. 75% of these male college students are business majors

C. 75% of these college students are male business majors

D. 75% of these male business majors are college students

E. More than one of the above

F. None of the above

Answer 2

Table 2

College students	SEX		
Major	Male	Female	ALL
Business	75%	25%	**100%**
Economics	17%	83%	**100%**
MIS	50%	50%	**100%**
ALL	50%	50%	**100%**

A. 75% of these college business majors are males

B. 75% of these male college students are business majors

C. 75% of these college students are male business majors

D. 75% of these male business majors are college students

E. More than one of the above

F. None of the above

Question 3

Percentage of Females			
	Non-Smoker	Smoker	ALL
Non-Runner	49%	25%	40%
Runner	30%	33%	32%
ALL	42%	29%	36%

A. 25% of non-running smokers are females

B. 25% of females are smokers who are non-runners

C. 25% of female smokers are non-runners

D. 25% of female non-runners are smokers

E. More than one of the above

F. None of the above

Answer 3

Percentage of Females			
	Non-Smoker	Smoker	ALL
Non-Runner	49%	25%	40%
Runner	30%	33%	32%
ALL	42%	29%	36%

A. 25% of non-running smokers are females

B. 25% of females are smokers who are non-runners

C. 25% of female smokers are non-runners

D. 25% of female non-runners are smokers

E. More than one of the above

F. None of the above

Another example

boston.com

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'Exercise labels' beat out calorie counts in steering consumers away from junk food

December 20, 2011

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(Relaxnews) - American health experts are suggesting that junk food and sodas be packaged with "exercise labels" to let consumers know exactly how much exercise is required to burn off the calorie and fat content within the products. A can of soda? Fifty minutes of jogging on a treadmill.

Researchers at Johns Hopkins's Bloomberg School of Public Health in the US observed teenagers at stores where signs displayed either calorie counts, calorie counts as a percent of recommended daily calorie intake, or the time spent jogging that would be needed to burn off the drink.

Another example

One can of cola = one hour's run: Exercise labels could be 'more effective than calorie counts'

By DAILY MAIL REPORTER
UPDATED: 03:24 EST, 16 December 2011

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Warning labels that explain how much exercise is needed to run off the calories in junk food are far more effective than traditional counts, researchers say.

It was found that teenagers who were shown the warnings on fizzy drink cans - which stated an hour's run would be needed to get rid of the calories - were half as likely to drink them.

Data Literacy in the real world

HOW STATISTICS CAN MISLEAD

I read with interest the study by Bleich et al. on reducing purchases of sugar-sweetened beverages in low-income Black adolescents using caloric information.[1] The study is relevant, well designed, and has an intriguing hypothesis—that labeling food with "exercise equivalents" is more effective at curbing consumption than using absolute calorie counts. However, the article is misleading because of several problems with the statistical analysis and interpretation.

TABLE 1—Absolute Percentages, Odds Ratios, and Risk Ratios for the Purchase of SSBs by Caloric Condition: A Store-Based Intervention to Reduce SSB Consumption Among Low-Income Black Adolescents, Baltimore, MD, April–October, 2010

Condition	SSBs, Unadjusted %	Unadjusted Risk Ratio	Adjusted OR	Adjusted Risk Ratio[a]	SSBs, Adjusted %[b]
Preintervention (no information)	93.3	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)	93.3
Any caloric information	86.7	0.93	0.56	0.95	88.6
Specific conditions					
Absolute calories	87.5	0.94	0.62	0.96	89.6
Daily value, %	86.5	0.93	0.59	0.96	89.1
Physical activity equivalent	86.0	0.92	0.51	0.94	87.7

Source:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3464840/pdf/AJPH.2012.300697.pdf

Data Literacy in the real world

Sainani criticizes our article for "a needless emphasis on odds ratios" but we present the change in sugar-sweetened beverage rates (Table 2 in original article), odds ratios (ORs; Table 3 in original), and the predicted probability of beverage purchases pre- and post-intervention (Figure 1 in original). Because we acknowledge that the use of odds ratios in certain contexts may be undesirable, we deliberately reported the unadjusted frequencies and predicted probabilities to give an undistorted sense of the effect size. She provides an example of a newspaper misinterpreting what an odds ratio actually means, but we certainly cannot be held responsible for how the media presents our results.

Defining Data Literacy

- Data Collection
  - Observational Studies, Sampling and Experimental Design
- Data Quality and Reliability
- Data Management
- Data Visualization
- Statistical Literacy
  - Correlation vs. Causation
  - Confounders & Lurking Variables
- Statistical Inference
- Working with Messy Data
- Data Privacy
- Data Compliance
- Exploratory Data Analysis
- Data as Evidence
- Data-Driven Decision Making
- Storytelling with Data

Dedicating 2017 to Data Literacy

- Determine your organizational strengths and weaknesses
- Establish areas of high and medium priority
- Identify data literacy needs across all the levels of your organization
- Establish communities of practice for data and statistical literacy learning programs

Thank You!

Harshil Parikh

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