Data Visualization and Learning Analytics in an RPP context

Fabio Campos (PMR2 | NYU) @ **NNERP 2019**

The plan:

1. A glimpse at the PMR2 project and respective RPPs.
2. Understanding potential representations of data.
3. Revisiting a dashboard's Theory of Action.
4. New ways of representing RPP data.
5. Mini-workshop

My Timeline (so far)

1998 — invest pré-vestibular comunitário

2012 — Prêmio fazDIFERENÇA O GLOBO

2010 — oi

2012 — Teach For All

2014 — RIO PREFEITURA EDUCAÇÃO

2016 — oi FUTURO

1997 – 2000 — UFRJ

2013 — GEORGETOWN UNIVERSITY 1789

2017

??? — NYU

Learning Sciences & Technology Ed.

Advised by June Ahn (@UCI)

Improvement Science

https://www.carnegiefoundation.org

PMR2

Practical Measures, Routines and Representations

NSF

Stanford · Vanderbilt University · W · UCR · NYU · UCI

Federal Way Public Schools · Metro Nashville Public Schools · SFUSD

PMR2 in a nutshell

Math!

PRACTICAL MEASURES

Whole Class Discussion

Small Group Discussion

Launch of the task

Rigor of the task

ASSOCIATED ROUTINES

Coaching cycles

Data collection

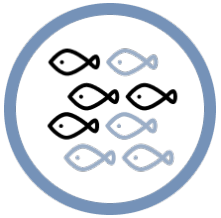
Data analysis and reflection

Negotiating Improvement Goals

DATA REPRESENTATIONS

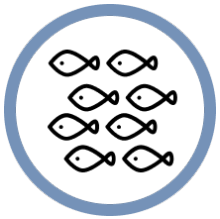
Edsight: a suite of visual learning analytics tools to represent measures and support routines.

Our suite of measures



Small Group Discussion

Students' experiences with key aspects of discussion during small group work. [2-3min survey].



Whole Class Discussion

Students' experiences with key aspects of discussion during small group work. [2-3min survey.]

Launch of a Task

Students' experiences with teacher's introduction to a mathematical task. [1min reaction survey.]

Rigor of the Task

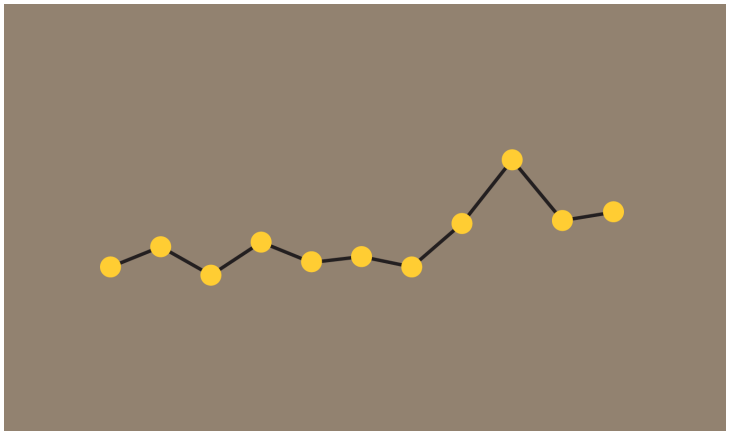
Used by a coach with a teacher to discuss the rigor of the task selected for a lesson. [*coming soon*]

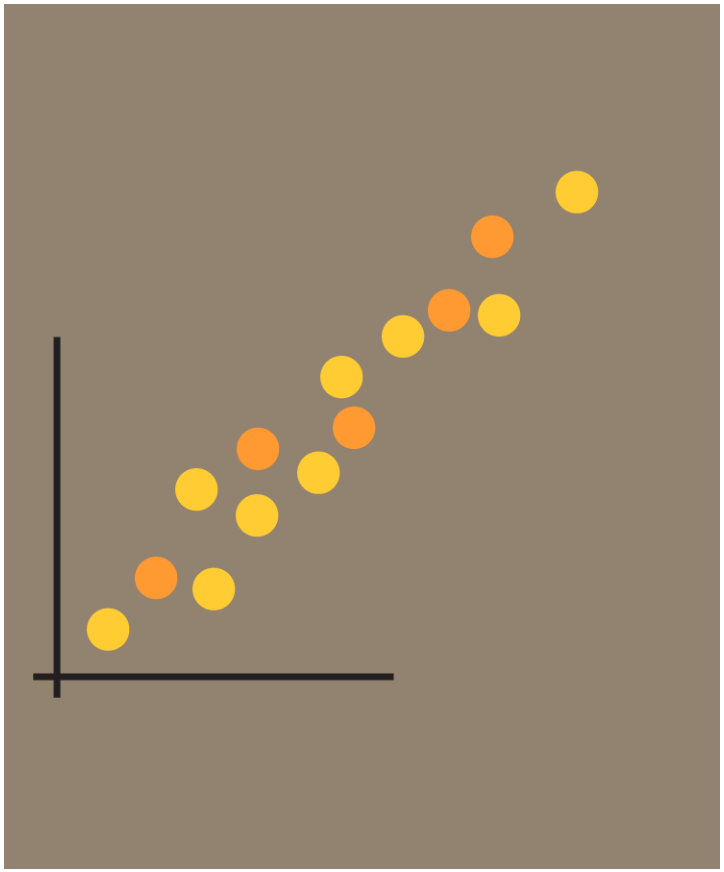
Download them here

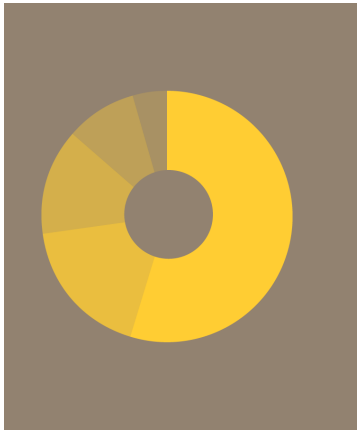
https://www.pmr2.org

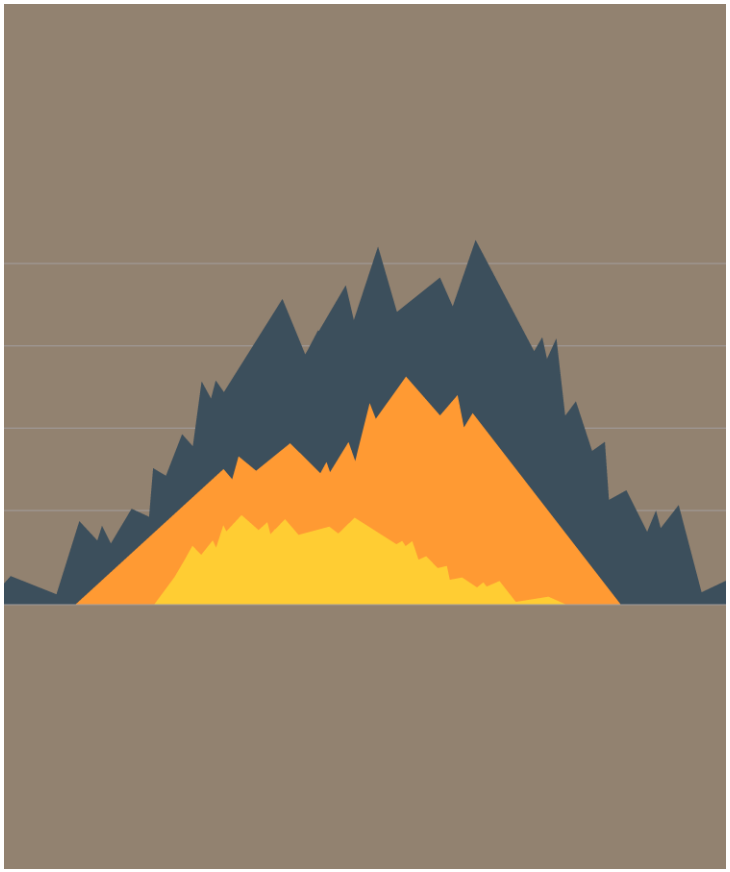
Data
Data
Data

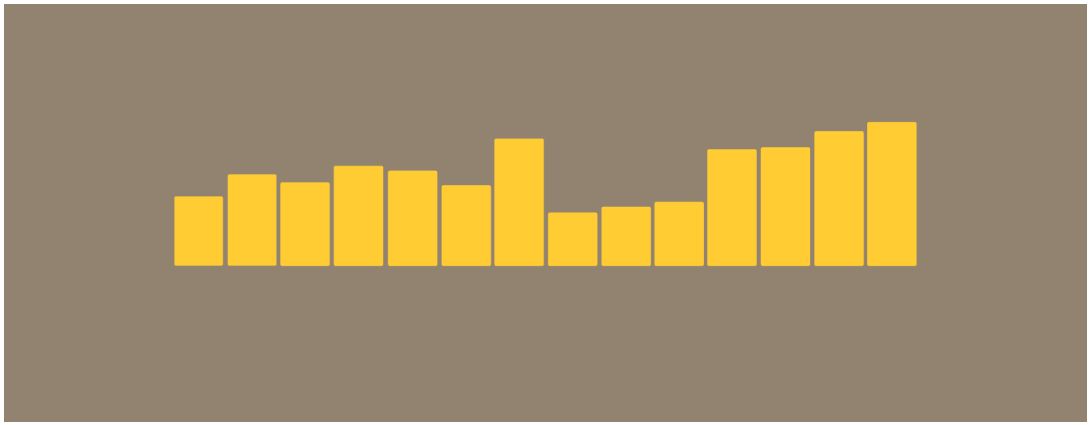
Graphs
Graphs
Graphs

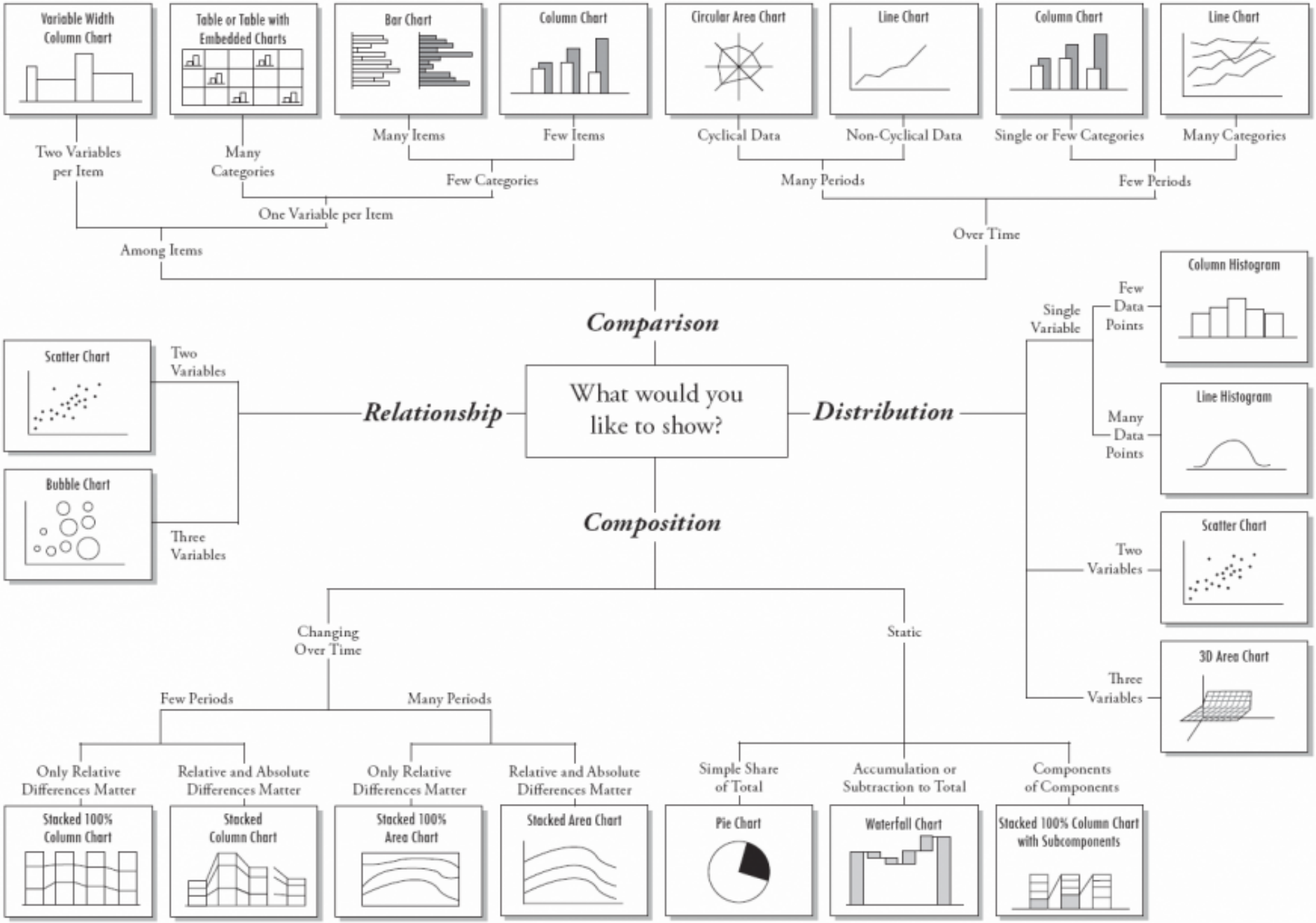










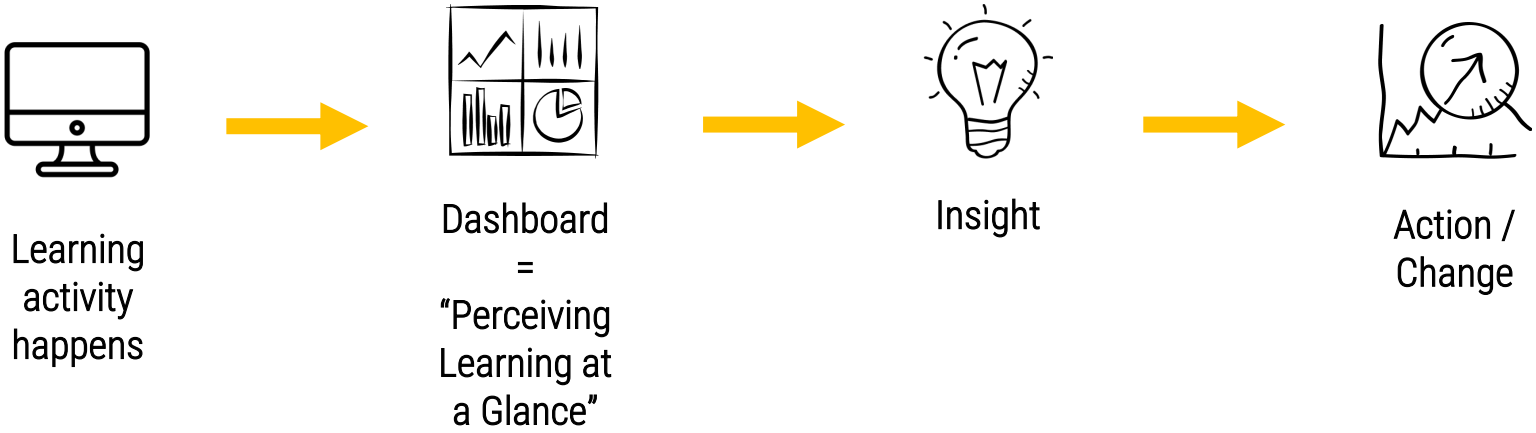

What would you like to show?
Comparison
Relationship
Distribution
Composition
Variable Width Column Chart
Table or Table with Embedded Charts
Bar Chart
Column Chart
Circular Area Chart
Line Chart
Column Chart
Line Chart
Two Variables per Item
Many Categories
Many Items
Few Items
Cyclical Data
Non-Cyclical Data
Single or Few Categories
Many Categories
Few Categories
Many Periods
Few Periods
One Variable per Item
Over Time
Among Items
Scatter Chart
Bubble Chart
Two Variables
Three Variables
Single Variable
Few Data Points
Many Data Points
Column Histogram
Line Histogram
Two Variables
Scatter Chart
Three Variables
3D Area Chart
Changing Over Time
Static
Few Periods
Many Periods
Only Relative Differences Matter
Relative and Absolute Differences Matter
Only Relative Differences Matter
Relative and Absolute Differences Matter
Simple Share of Total
Accumulation or Subtraction to Total
Components of Components
Stacked 100% Column Chart
Stacked Column Chart
Stacked 100% Area Chart
Stacked Area Chart
Pie Chart
Waterfall Chart
Stacked 100% Column Chart with Subcomponents

Dashboards
Dashboards
Dashboards


fitbit
Dashboard
Log
Community
Premium
Products
Activity
Steps
15,832
Leaderboard
Calories burned
20,010
Floors
1.2
Active vs Sedentary
Sluggish
Activity levels
Distance (miles)
Today's Badges
55,000
Weight
yourLOGO
3,009
Facebook Likes
342
Youtube Subscribers
143
Linkedin Followers
35,295
Website Visitors
Organic Search - 16,028
Direct - 9,324
Paid Search - 6,177
Email - 1,228
Referral - 966
27
Google Rankings
1 to 3
4 to 10
11 to 20
21 to 50
51 to 100
Google Ran
44
Trust Flow
Audience Growth
Organic
Paid
Lost
20
Feb
Mar
AdWords Conversions
353
Jan
Feb
Mar
Site Audit Score
72%
1 RENAISSANCE LEARNING
2
ADMINISTRATOR USER, District
3 Log Out
4 Help
5
Accelerated Reader
District
Success Index
Last 30 days
54%
students who averaged at least 85% on quizzes
Participation
Last 30 days
40%
students who took at least one quiz
Engaged Time
School year to date
60
45
30
15
0
K-8
9-12
Goal
Actual
estimated average minutes
Totals
School year to date
Books Read
264
Words Read
1,057,638
based on Reading Practice Quizzes passed
Accelerated Math
Success Index
Last 30 days
0%
students who averaged at least 85% on tests
Participation
Last 30 days
15%
students with at least one assignment scored
Engaged Time
School year to date
1-2
3-12
Totals
School year to date
Objectives Mastered
73
Tests Scored
16
based on regular and diagnostic tests
STAR Learning to Read
Probable Readers
School year to date
100
75
50
25
0
K
1
2
3
Percent of K-3 students with GE of 1.9 and above
Participation
School year to date
56%
K-3 students with at least one STAR Early Literacy or STAR Reading test
MathFacts in a Flash
Benchmarks
School year to date
0%
students who met benchmark
Totals
School year to date
Levels Mastered
446
Facts Practiced
45,807
based on practices and tests
Activity Dash
Review the classr summary and d stude
Adaptive
Review ma in a gric
Writing Report
Review the classroom writing summary and drill down by student.
Assessment Grow
Energy Dashboard
TODAY
MONTH
YEAR
COST PREDICTED
Total $214
Electricity
Gas
CHANGE IN COST
$203
$214
May
Jun
5.42%
INCREASE IN COST
USAGE ESTIMATE
Till Now: 164.1 kWh
500
400
300
200
100
0
kWh
Jun 1
Emissions
ACTIVE APPLIANCES
Heating & AC
1.4 kWh
EV Charge
0.9 kWh
Plug Loads
0.8 kWh
Refrigeration
0.7 kWh
Lighting
0.4 kWh
ENERGY INTENSITY
47
kWh/Sqft
CARBON F
Emission
Till Date
36.4 Kg of
Green

How can a dashboard of learning data produce change?

Theory of Action of Learning Dashboards



Theory of Action of Learning Dashboards

DATA.GOV

Search Data.gov

DATA TOPICS IMPACT APPLICATIONS DEVELOPERS CONTACT

META - THE DATA.GOV BLOG

Moving from Open Data to Open Knowledge: Announcing the Commerce Data Usability Project

January 29, 2016 By Jeffrey Chen, Tyrone Grandison, and Kristen Honey

Opening up government to better serve the American people has been a key priority of this Administration from day one. On his first full day in office, President Obama signed the Memorandum on Transparency and Open Government, ushering in a new era of open and accountable government. Since then, the Administration has continued to take unprecedented steps to make government more efficient and effective, including launching Data.gov, establishing the international Open Government Partnership, and signing an Executive Order on Making Open and Machine Readable the New Default for Government Information. And under the Administration's direction, Federal agencies are developing and implementing their own open-government efforts.

The U.S. Department of Commerce (DOC), for instance, is an example of a Federal agency leading the charge on using open data to create real-world value. In just the past year, for instance, DOC established the Commerce Data Advisory Council, a group of up to 20 expert members helping to optimize the beneficial use of the full range of data that the DOC distributes, and the Commerce Data Service, a within-government start-up team forming partnerships with the twelve bureaus that make up the DOC to deliver products and services to help government agencies.

And in 2016, the DOC is committed to building on this momentum with new and expanded efforts to transform open **data** into **knowledge** into **action**.

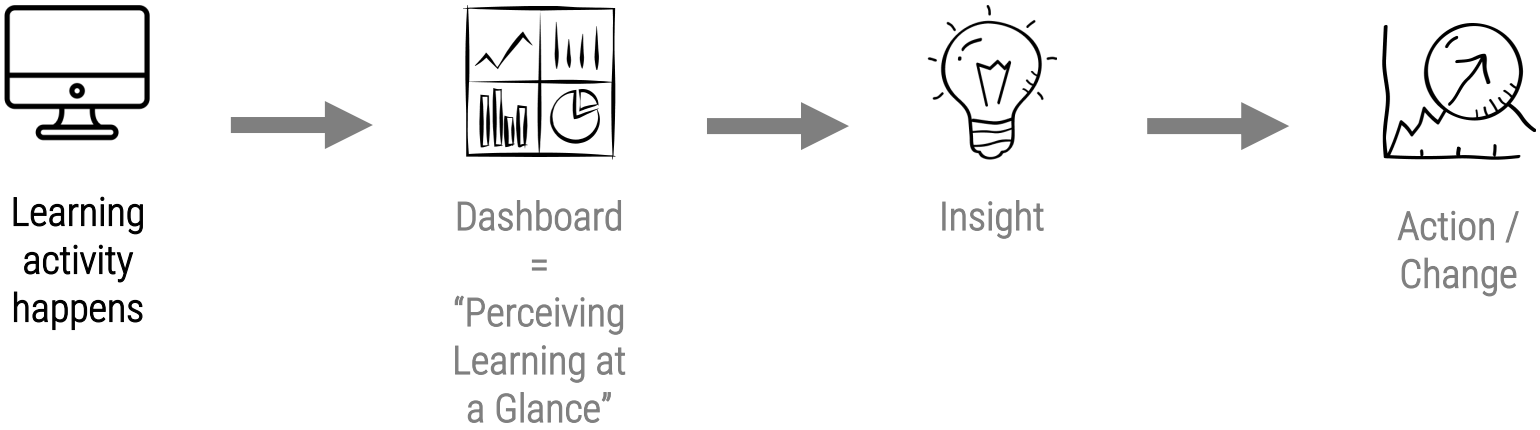
Graphic Credit: Radhika Bhatt, Commerce Data Service

DOC has been in the

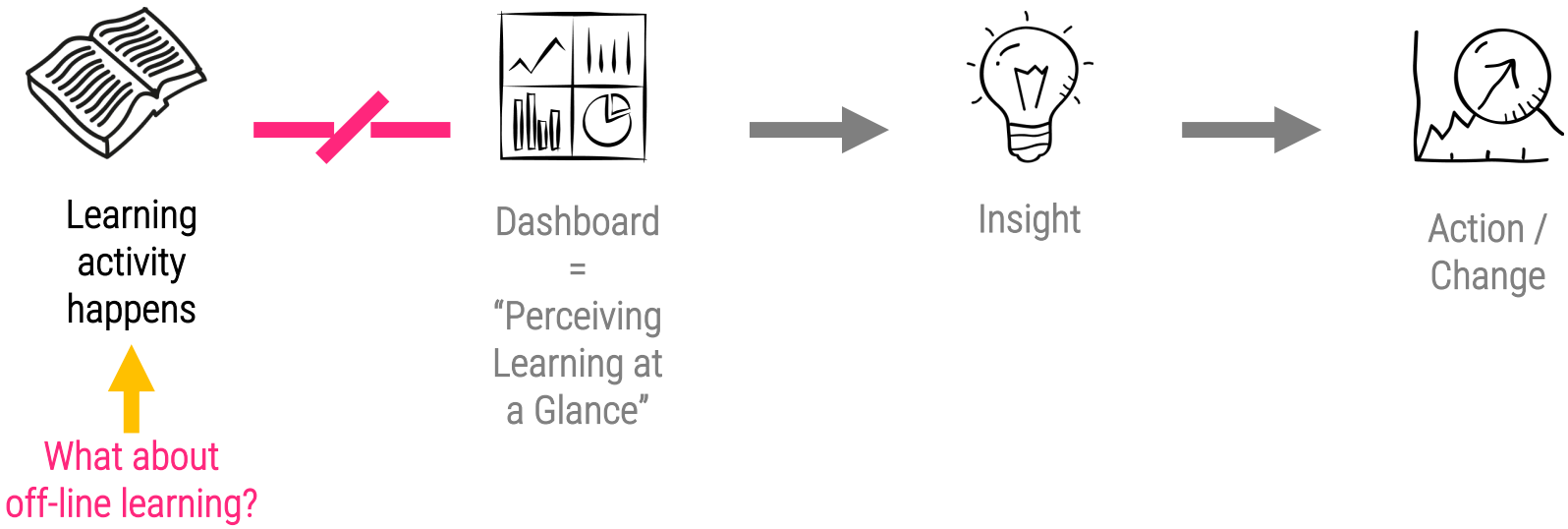
But

a.k.a “The Caveat Game”

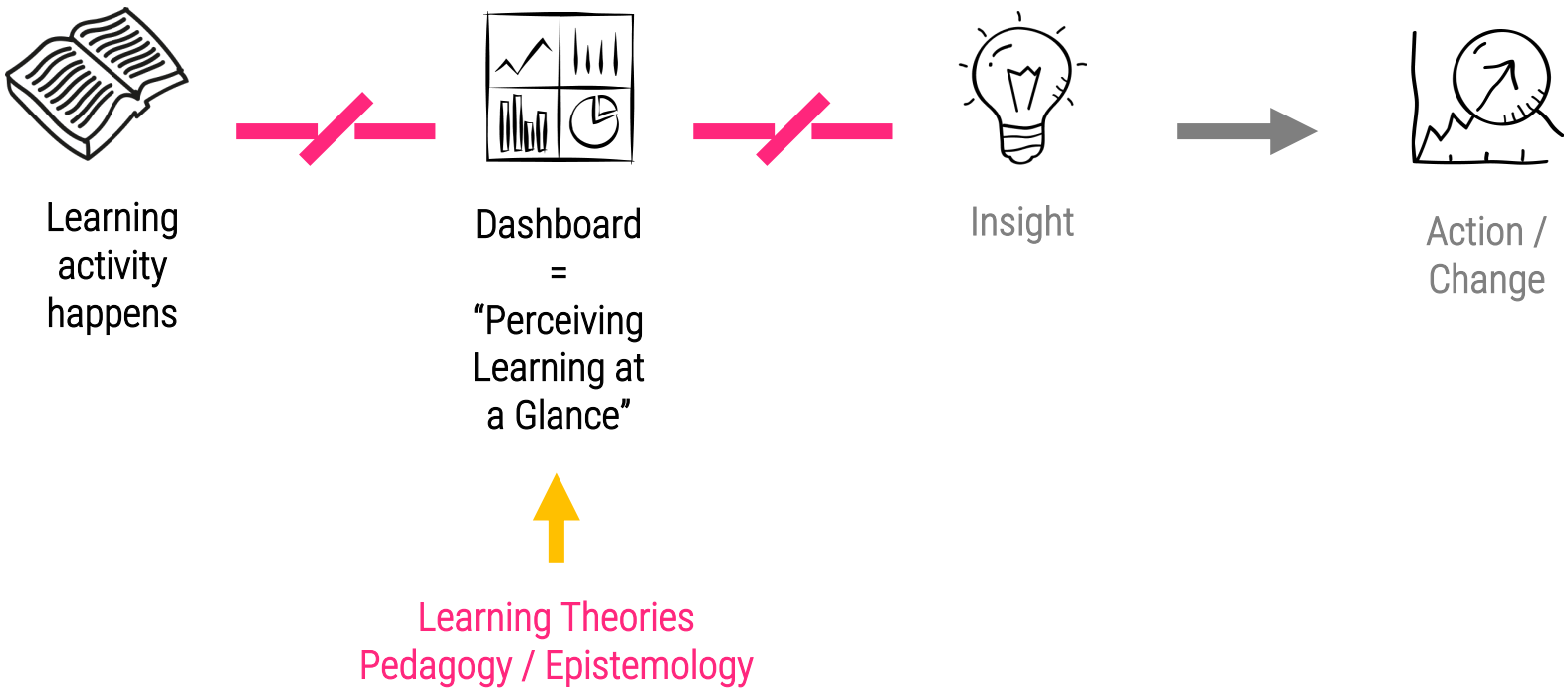
{revisiting the}
Theory of Action of Learning Dashboards



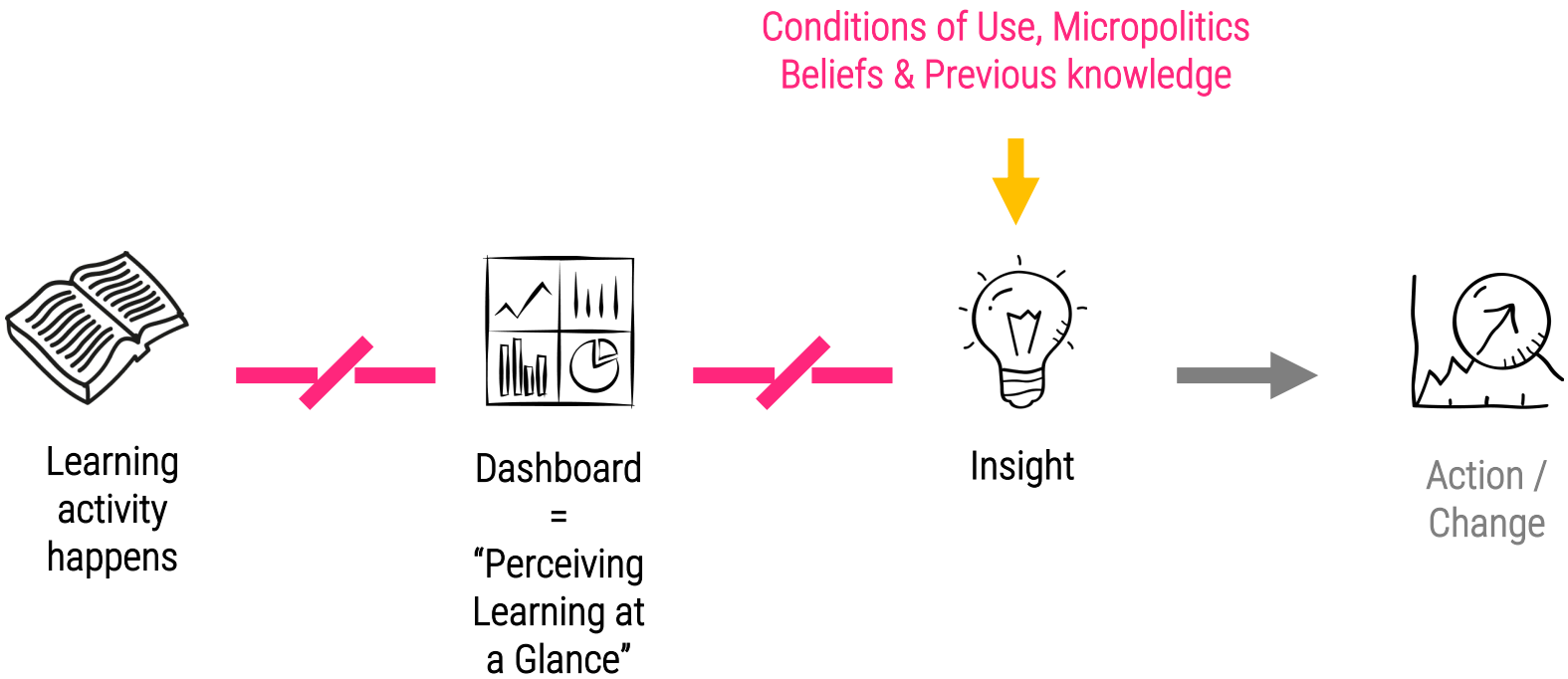
{revisiting the}
Theory of Action of Learning Dashboards



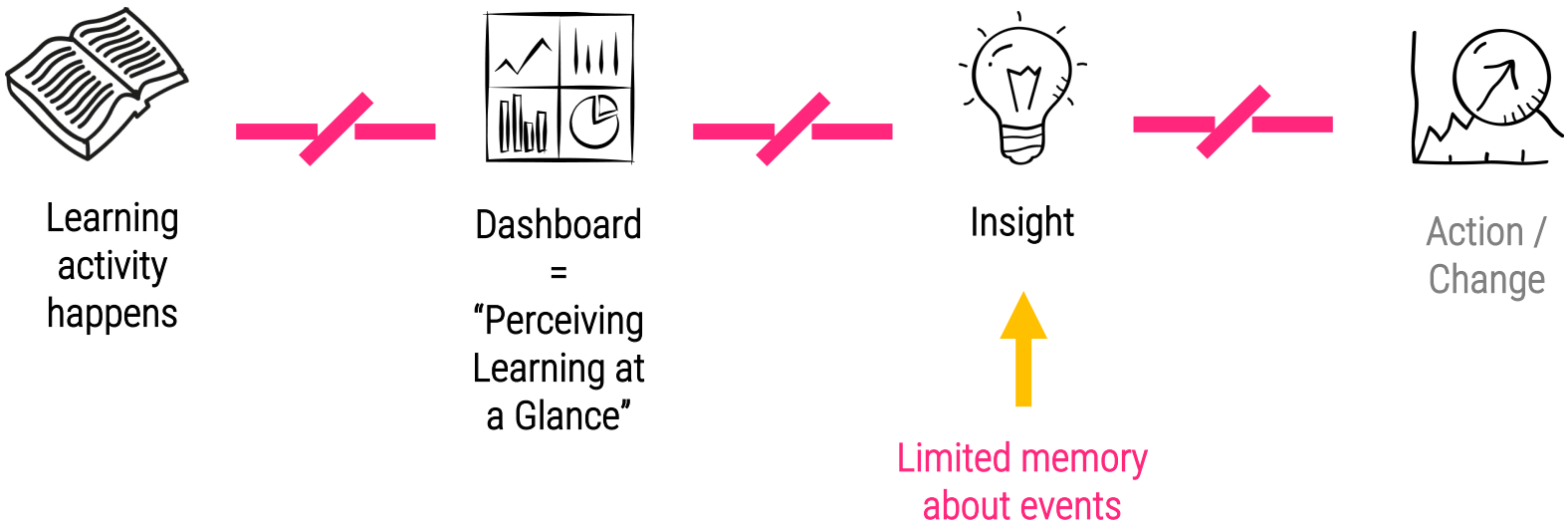
HCI is not enough



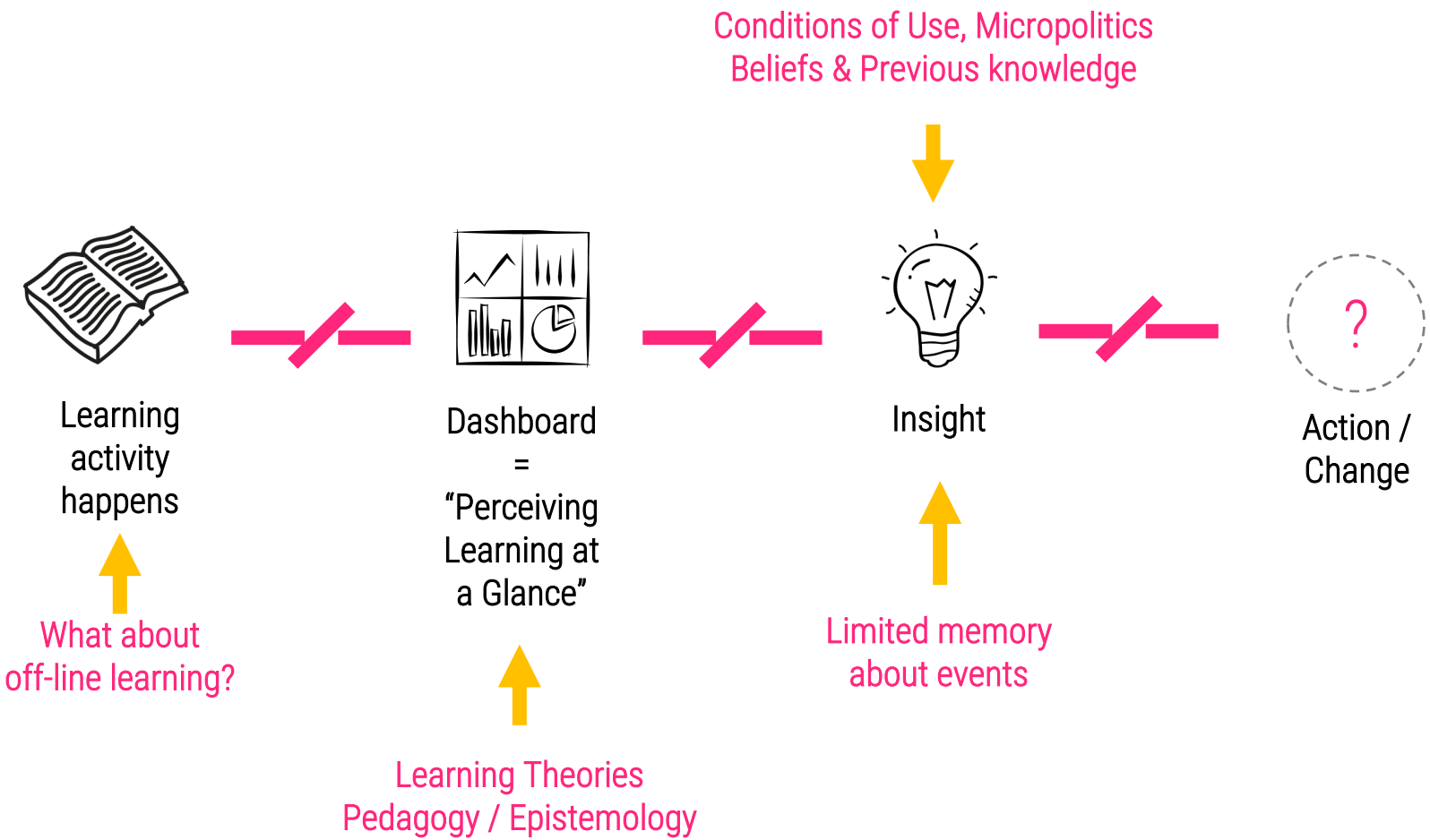
HCI is not enough



HCI is not enough



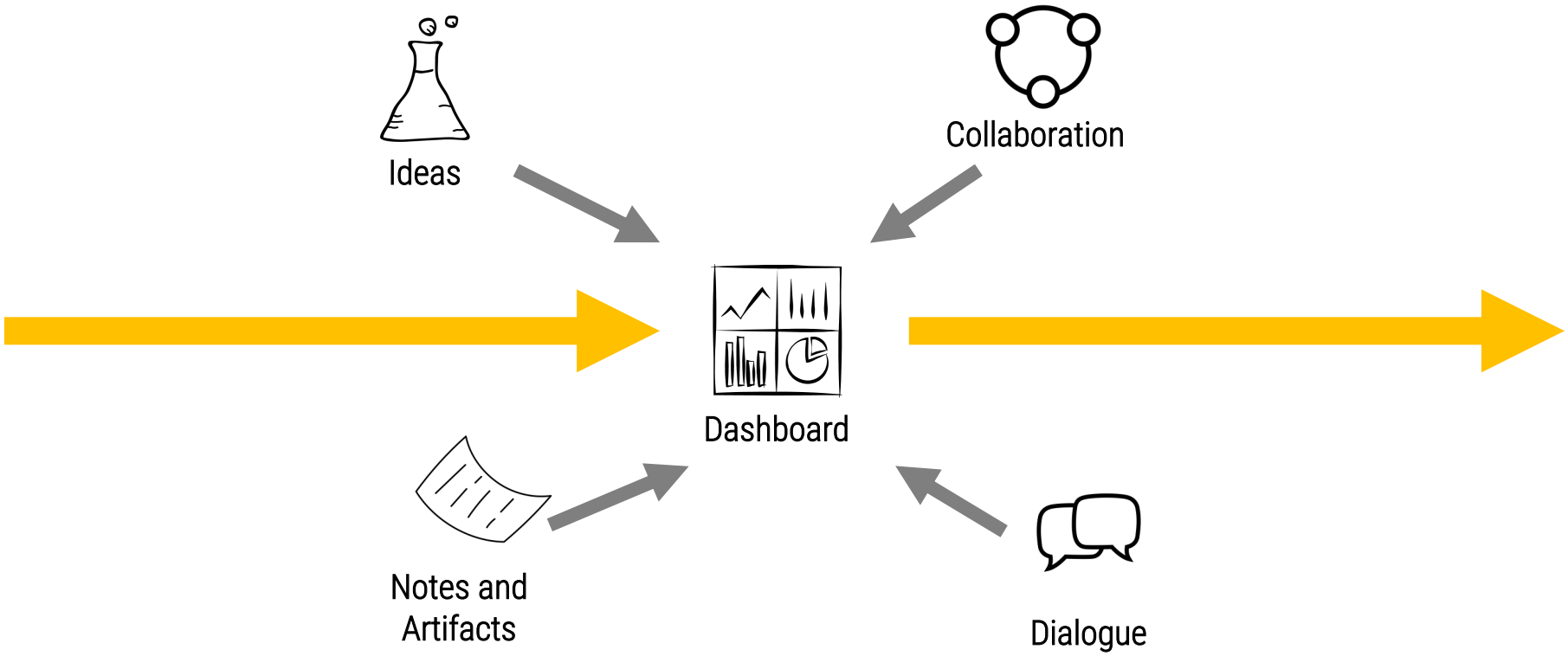
Limited research about Data Sense-making in schools and districts



You broke my toy.

Now give me something to play with.

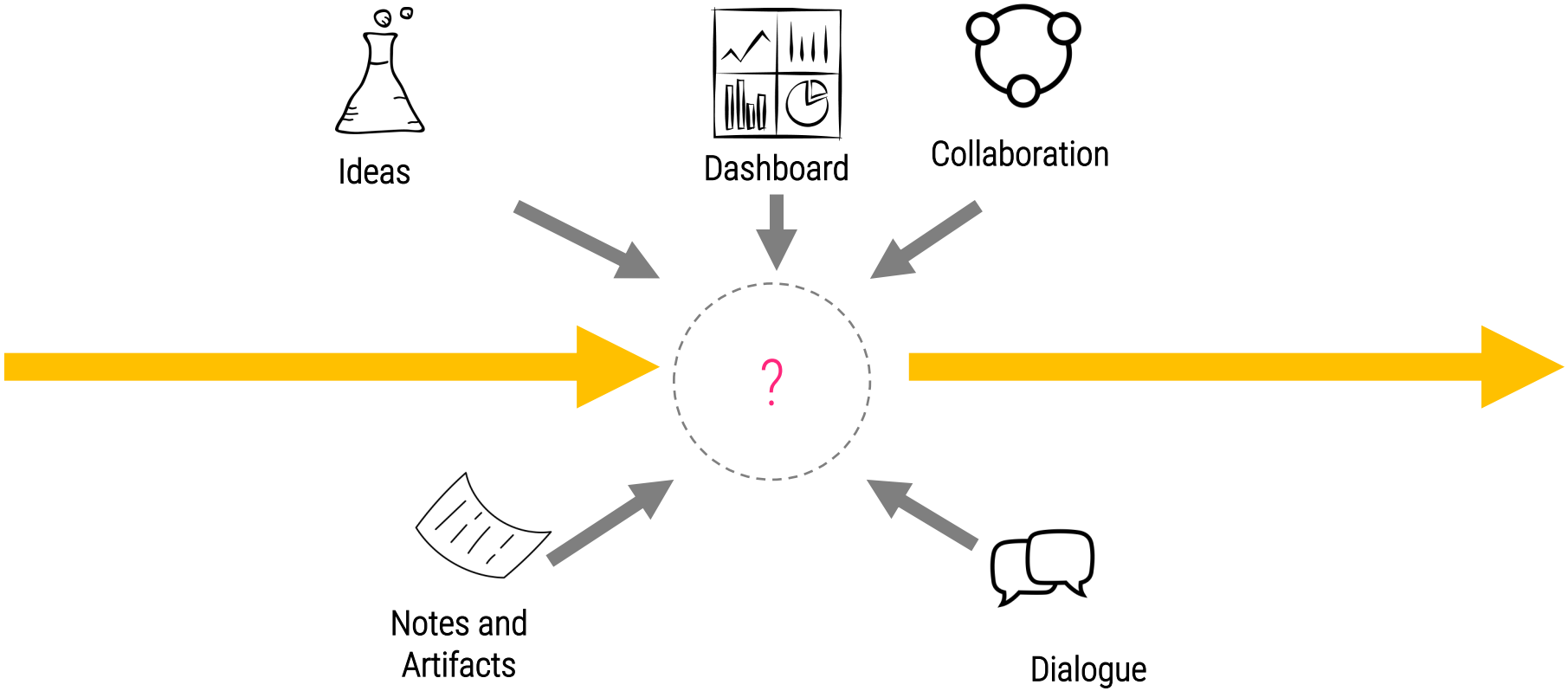
Infusing dashboards with ancillary data



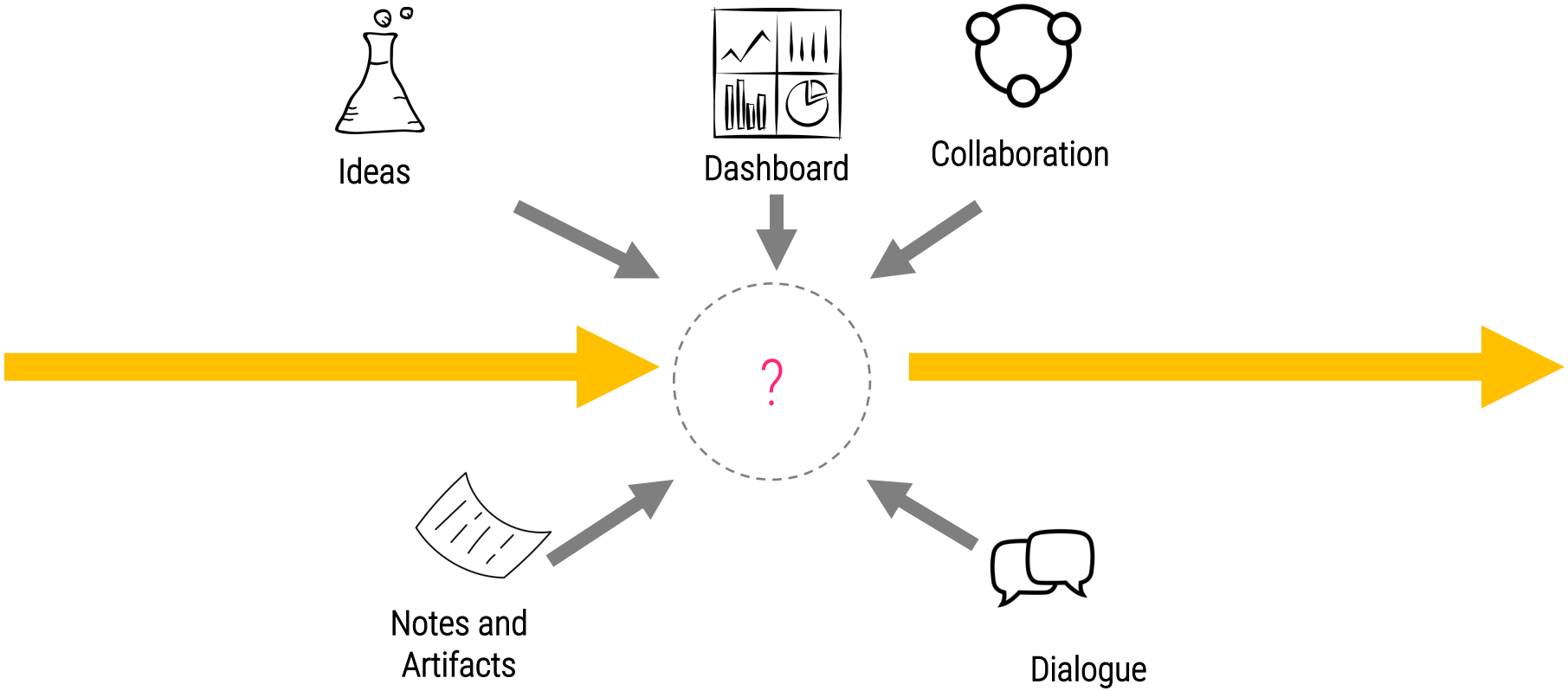
Wardrip, P. S., & Herman, P. (2018). 'We're keeping on top of the students': **making sense of test data with more informal data in a grade-level instructional team**. Teacher Development, 22(1), 31-50.

Perhaps we should ask the user what he thinks.

Infusing platforms with multiple forms of data



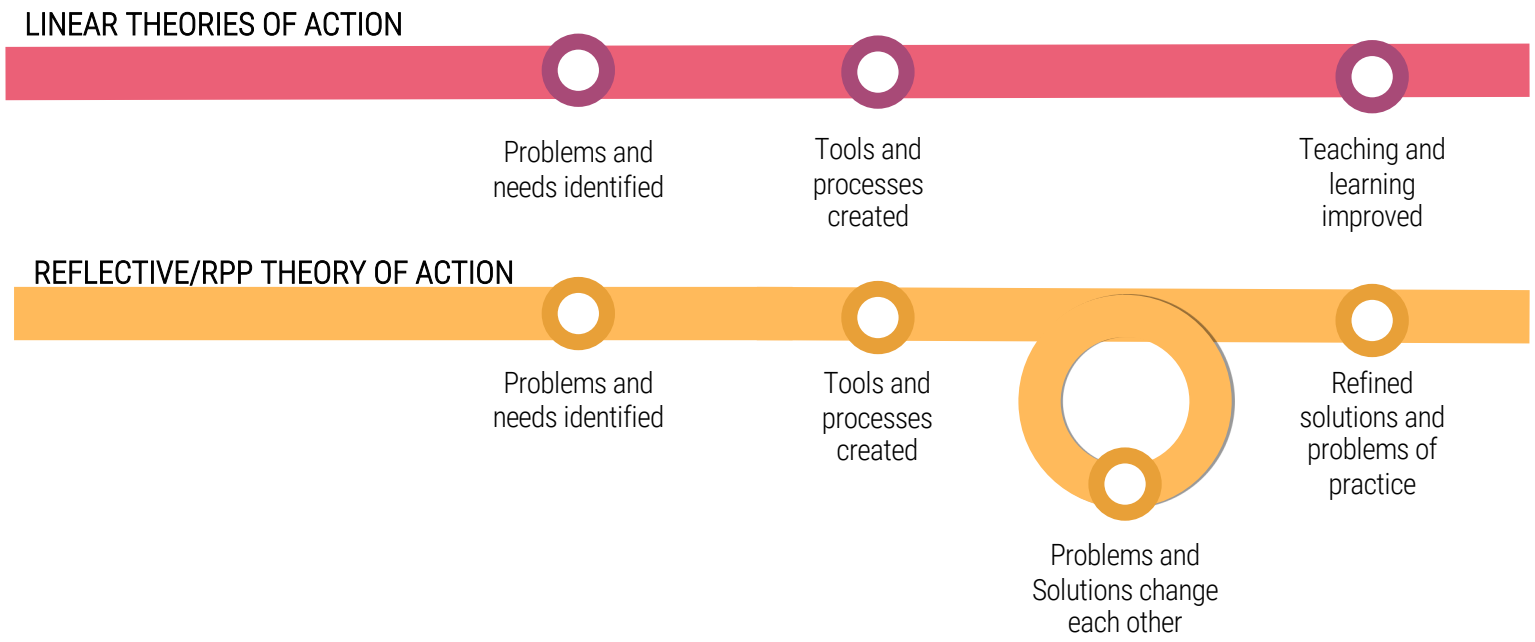
Infusing (storyboards?) with multiple forms of data



Echeverria, V., Martinez-Maldonado, R., Granda, R., Chiluiza, K., Conati, C., & Shum, S. B. (2018, March). **Driving data storytelling from learning design**.

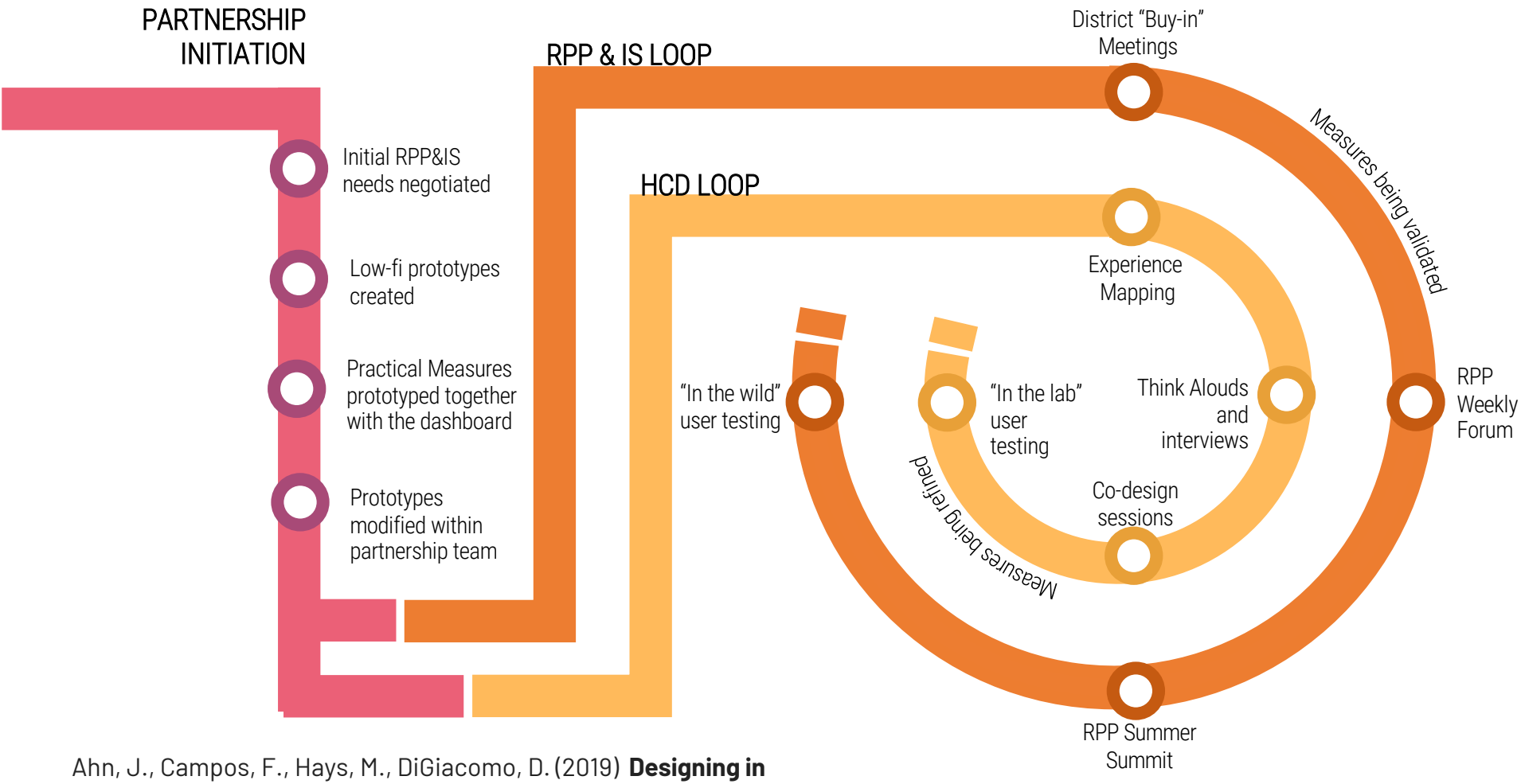
How do you decide what to and how to show? Where’s the silver bullet?

Covering the design front



Ahn, J., Campos, F., Hays, M., DiGiacomo, D. (2019) **Designing in Context: Reaching Beyond Usability in Learning Analytics Dashboard Design.** *Journal of Learning Analytics, 6*(2)

Covering the design front



Ahn, J., Campos, F., Hays, M., DiGiacomo, D. (2019) **Designing in Context: Reaching Beyond Usability in Learning Analytics Dashboard Design.** *Journal of Learning Analytics, 6*(2)


edsight.io
Overview
Monday, February 12th 2018
What have I tracked so far?
6th A
7th D
8th A
72%
54%
58%
Small Group Discussion 1
Whole Class Discussion 3
Which classes have been surveyed the most?
78%
6th Math, Period 1/2
6th Advanced Math, Period 3/4
7th Algebra, Period 1/2
Your latest survey is ready to be analyzed.
FEB
04
6th Grade, Algebra, Period 5/6, Small Class Discussion.2
Go to Report
Small Group Discussion..2
Question 1: Example question here, with presets defined by user
6th A, 7th D, 8th A
88%
15%
100 %
0%
Date
How many days have passed since I administered a survey?
08
Days
See all your surveys
Developed by NRL, UC Irvine, UC Riverside, University of Washington and Vanderbilt University, and supported by the National Science Foundation.
Report 22 November 2017 / 6th, 7th and 8th grades / Adv Math / Period 1/2 / Small Group Discussion 2
Question 1
What did you need to do in order to be successful in your math class today?
Question 2
Was there one right way to solve problem(s) today?
Activity List

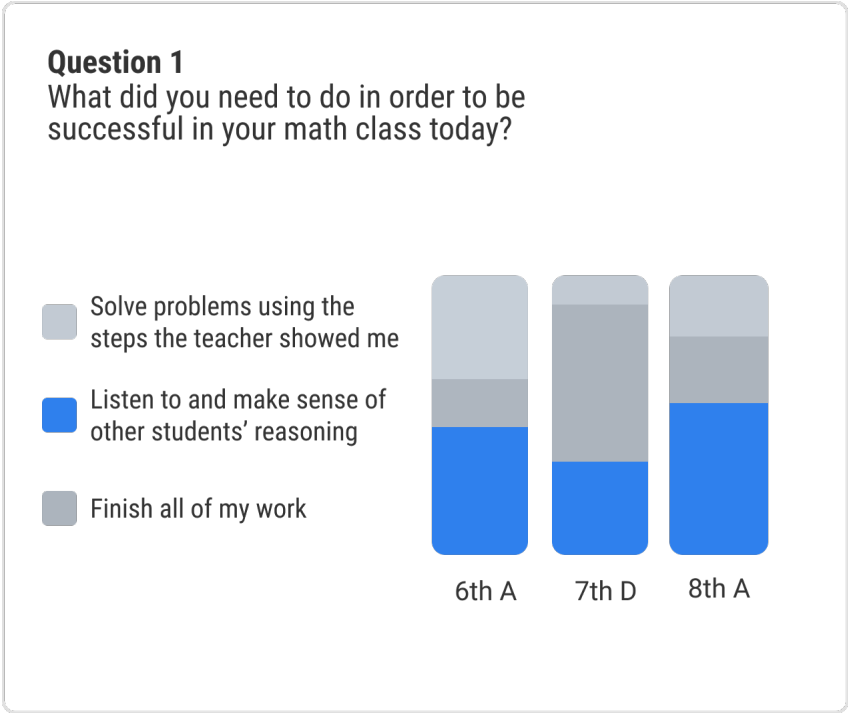
edsight.io

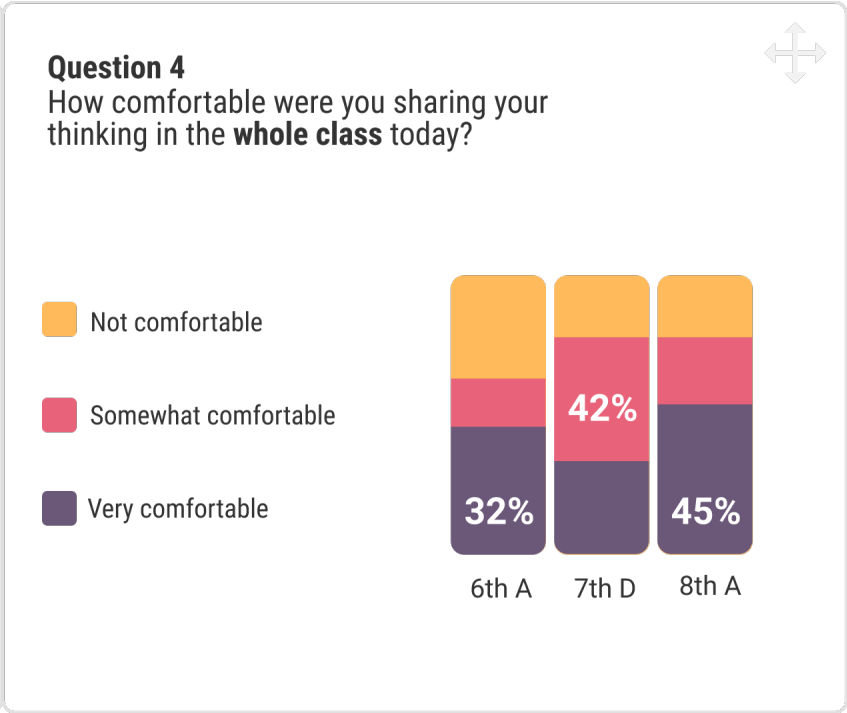
For teachers

Developed by NYU, UC Riverside, University of Washington and Vanderbilt University, and supported by the National Science Foundation.

Exemple:

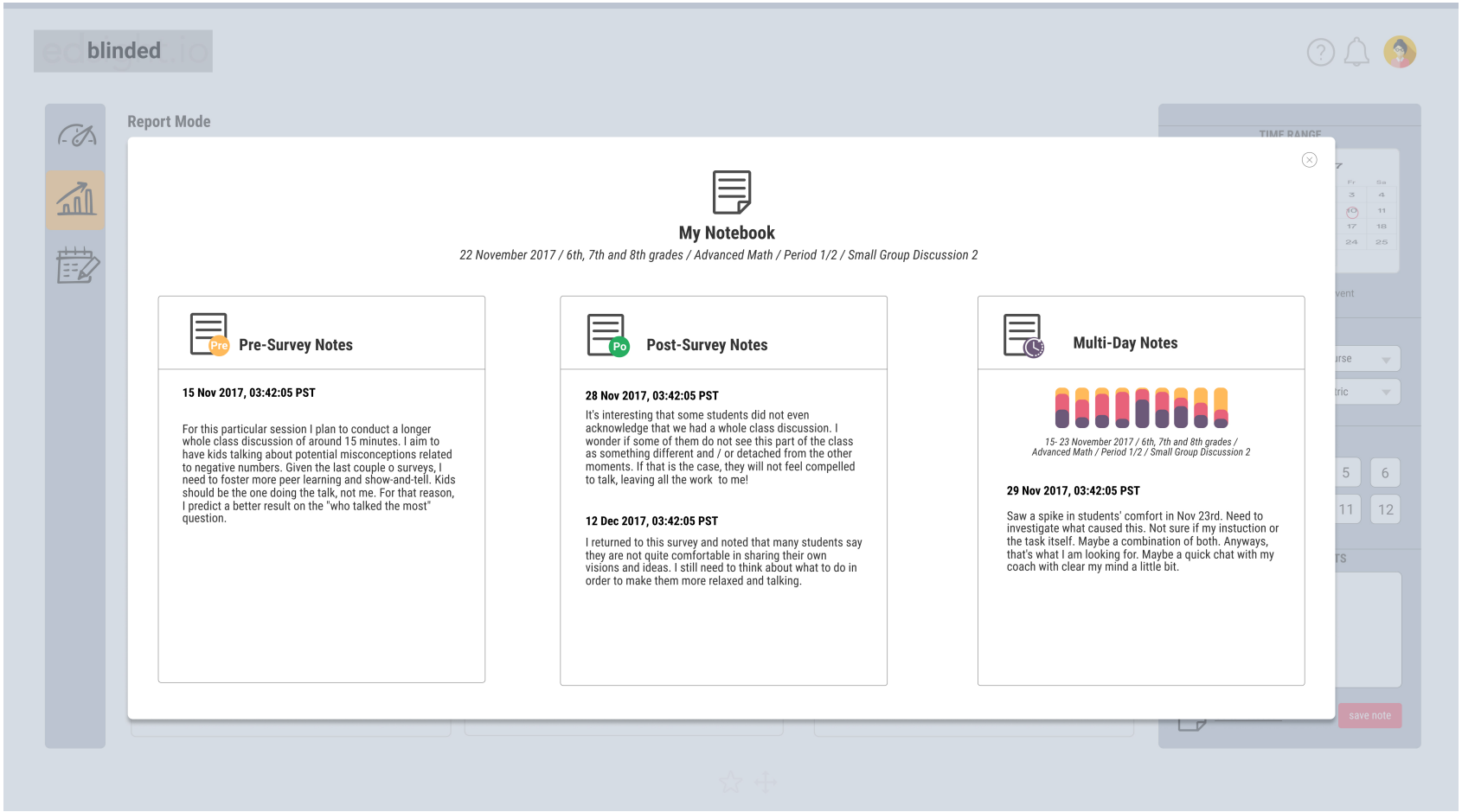
Automated reflection and the Rx effect



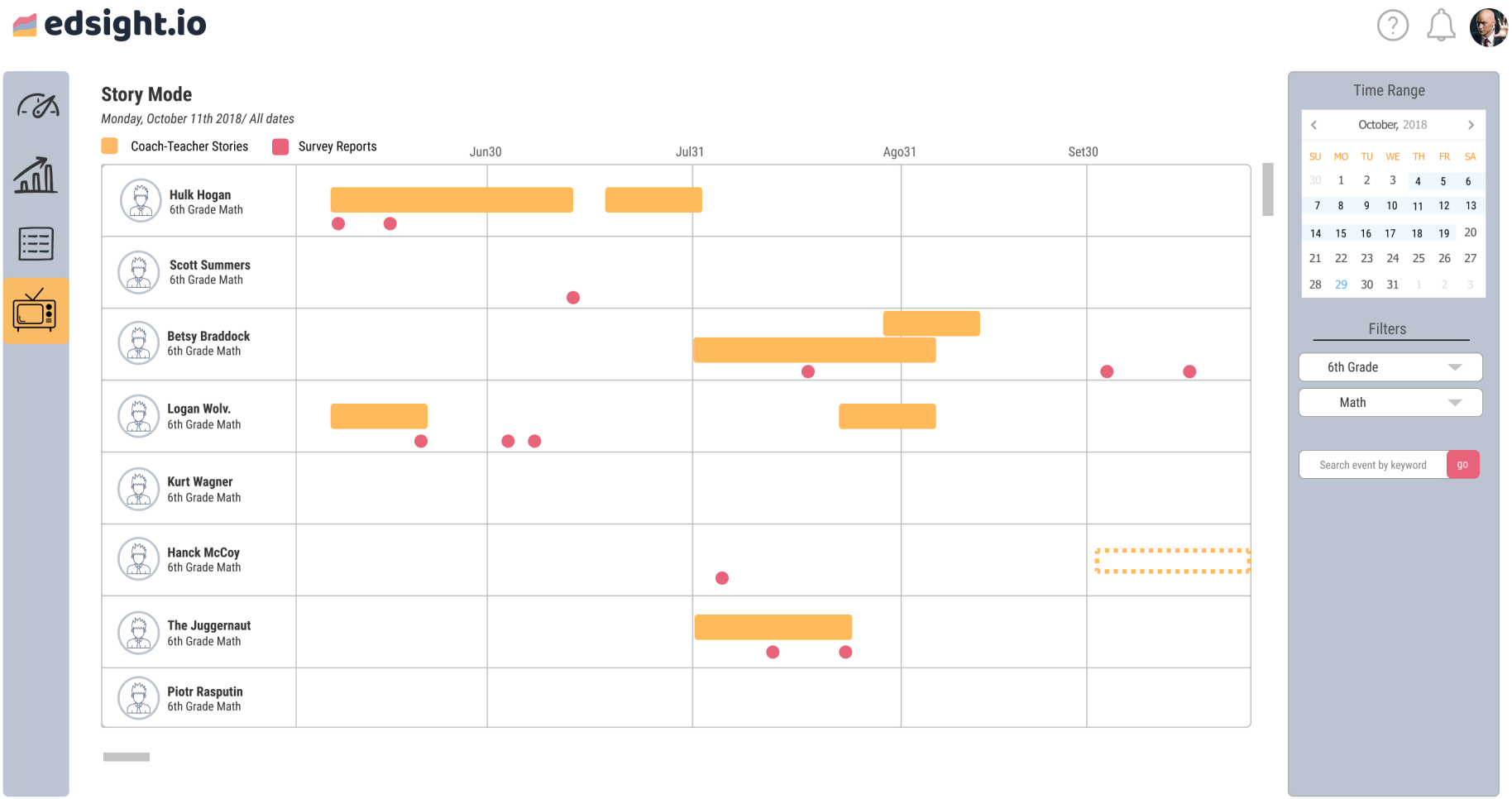


Exemple:

Fighting memory limitations (with a very simple tool).



For coaches



Developed by UC Irvine, UC Riverside, University of Washington, Vanderbilt University and NYU, and supported by the National Science Foundation under Grant No.1719744; 1620851; 1621238; 1620863

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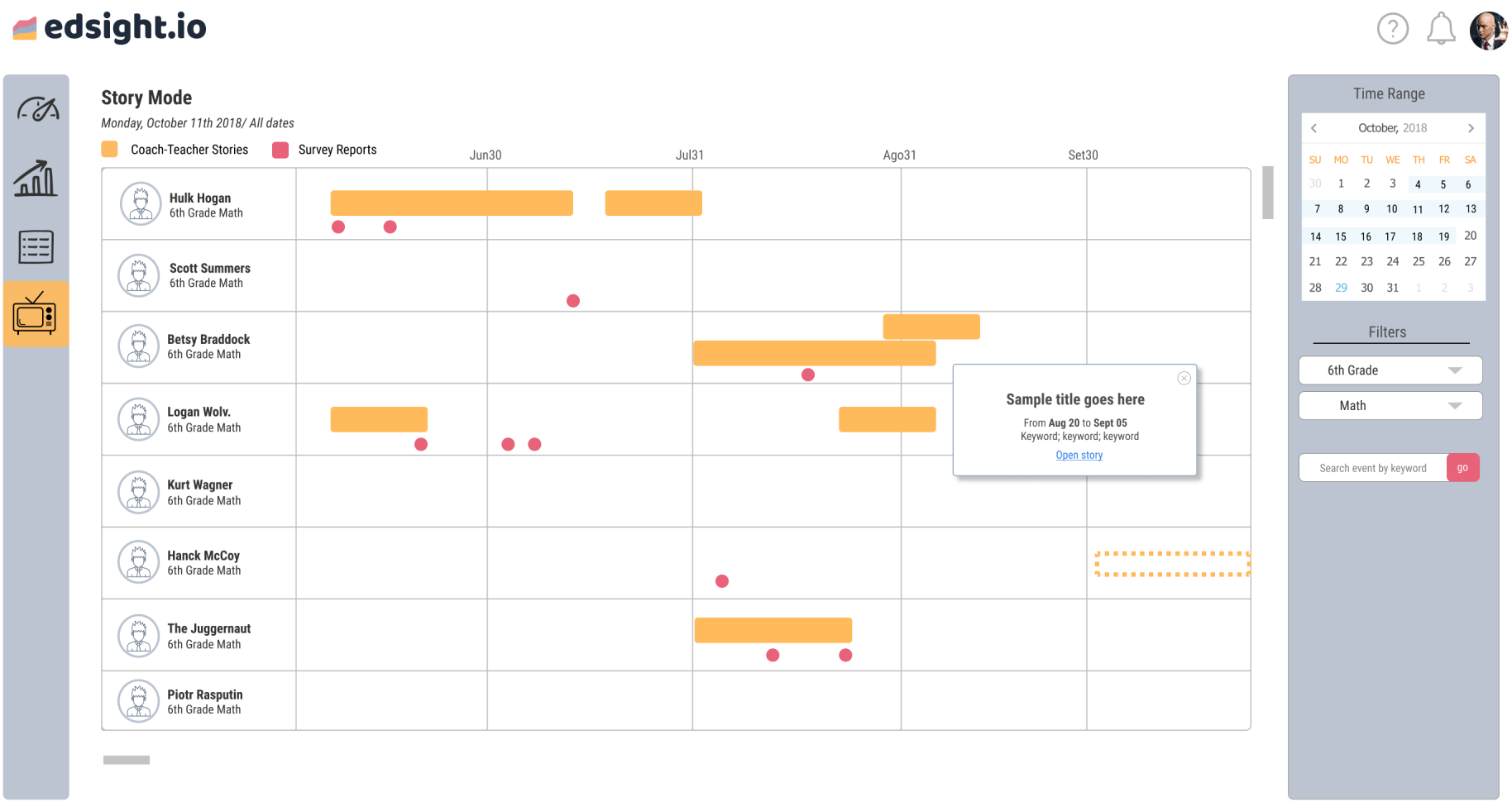

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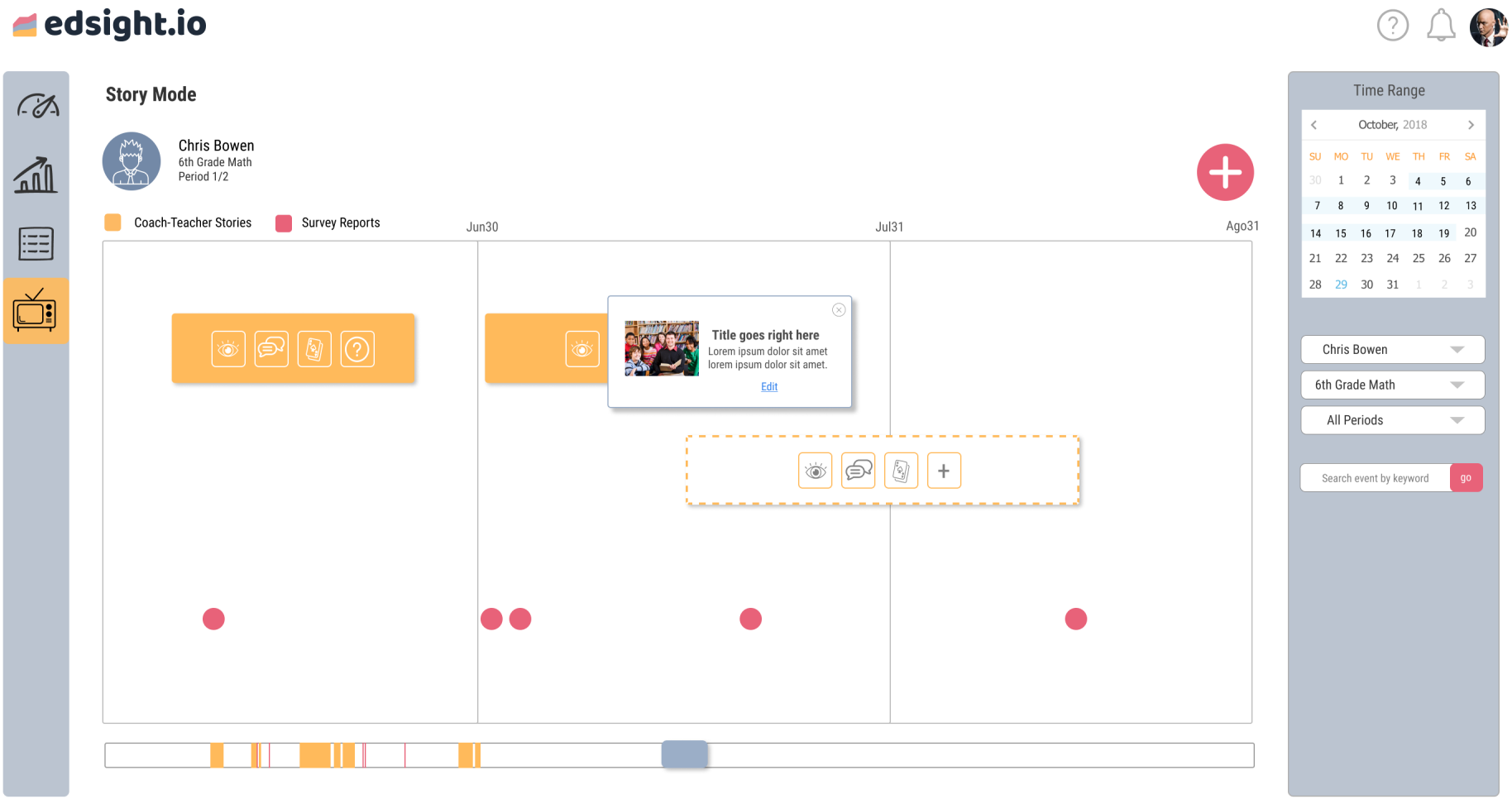

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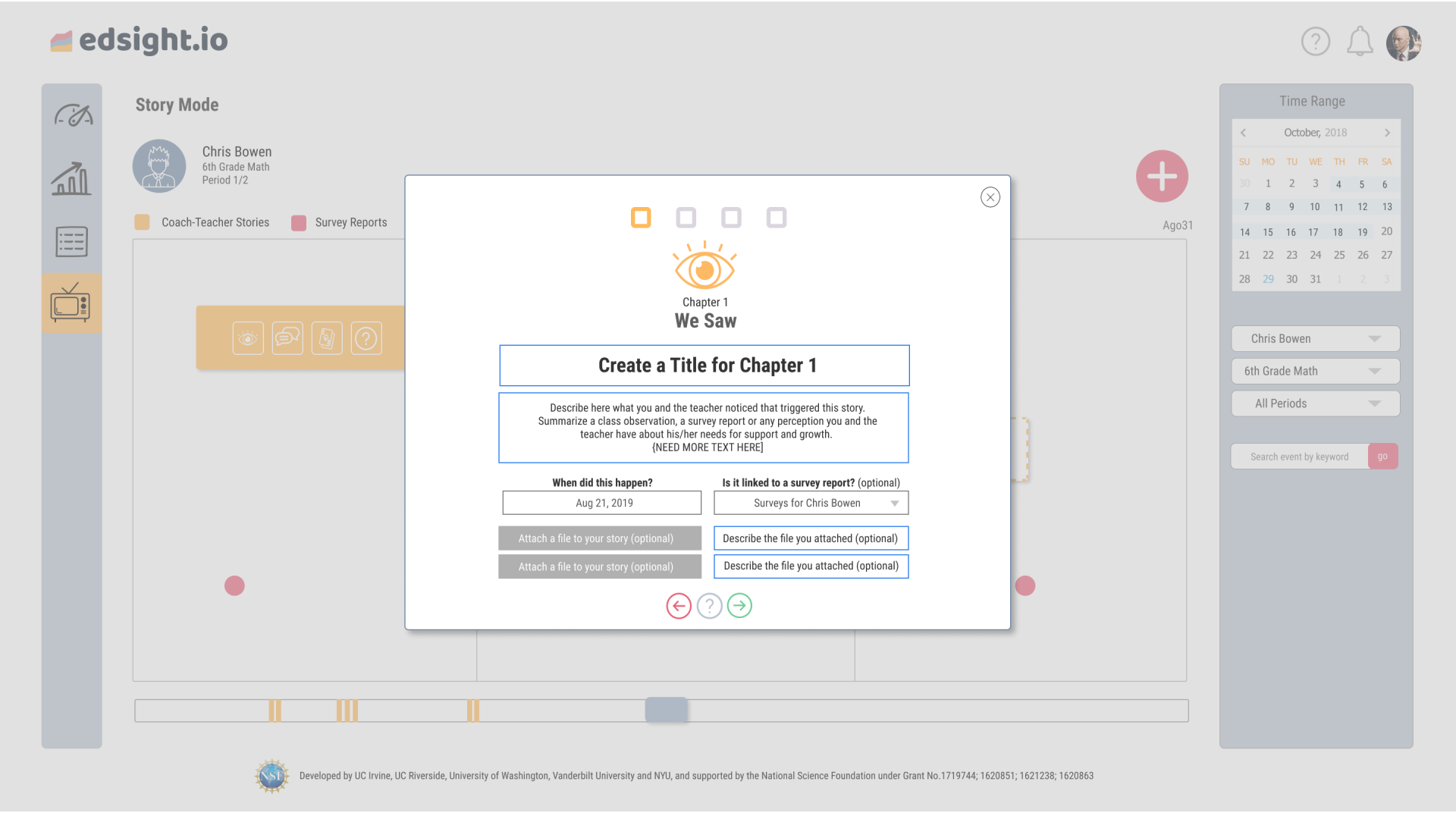
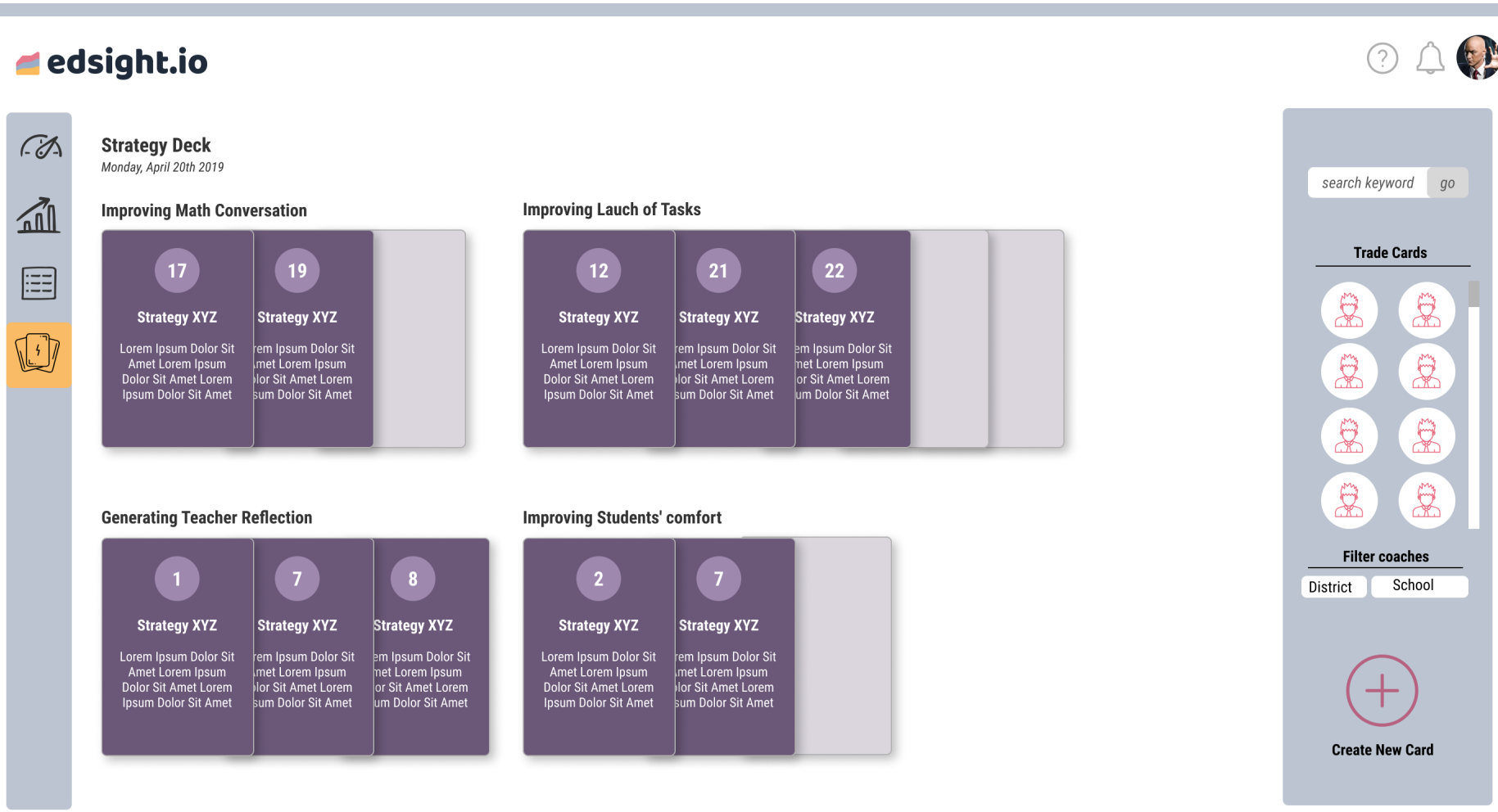

edsight.io
Story Mode
Chris Bowen
6th Grade Math
Period 1/2
Coach-Teacher Stories
Survey Reports
Ago31
Chapter 1
We Saw
Create a Title for Chapter 1
Describe here what you and the teacher noticed that triggered this story.
Summarize a class observation, a survey report or any perception you and the teacher have about his/her needs for support and growth.
{NEED MORE TEXT HERE}
When did this happen?
Aug 21, 2019
Is it linked to a survey report? (optional)
Surveys for Chris Bowen
Attach a file to your story (optional)
Describe the file you attached (optional)
Attach a file to your story (optional)
Describe the file you attached (optional)
Time Range
October, 2018
SU MO TU WE TH FR SA
Chris Bowen
6th Grade Math
All Periods
Search event by keyword
go
Developed by UC Irvine, UC Riverside, University of Washington, Vanderbilt University and NYU, and supported by the National Science Foundation under Grant No.1719744; 1620851; 1621238; 1620863

For coaches



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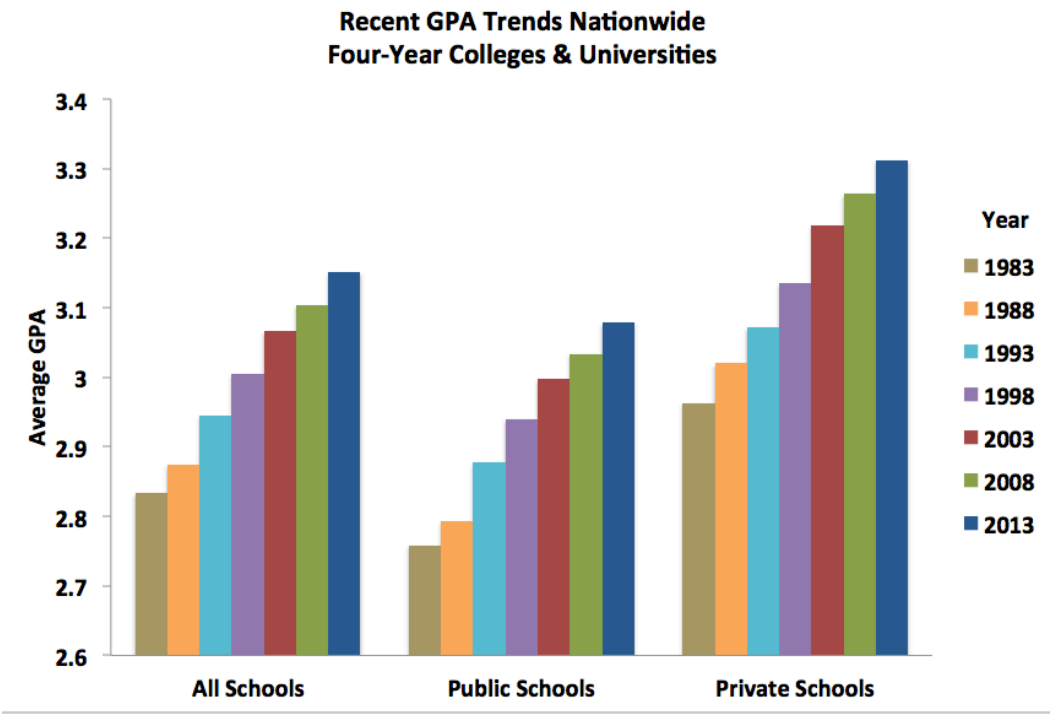
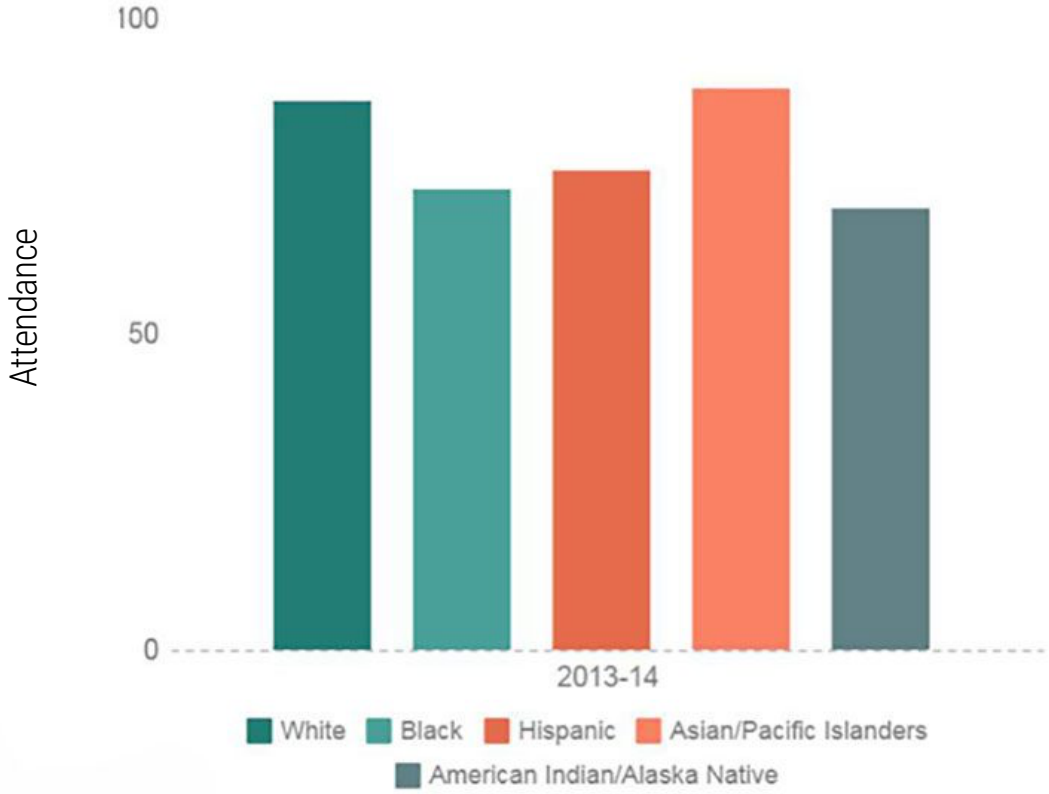
Asking annoying questions.

Especially in the contexto of RPPs

What decisions do you expect to make by knowing this data?



What decisions do you expect to make by knowing this data?



Let’s think together.

A design checklist

1. What type of information does your RPP use to make decisions at the school level?
2. What decisions do you expect to make based on #1?
3. What information is “central” and what is “ancillary”? Why?
4. How is this information usually represented?
5. Who generates the information? What is the trigger?
6. Who consumes it? When / Trigger?
7. What conditions of use (of data) can you map?
8. Which routines are mapped into your data cycle?
9. Which pedagogical and epistemological beliefs are embeded in your data system (i.e. what does learning and knowing means)?

Insights?

An invitation

Share insights about reflection cards and storyboards (25-30min, via Zoom).

fabioc@nyu.edu