

# Co-Designing Data Dashboards from Research-Practice Partnerships and Learning Analytics Perspectives

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# Our Team

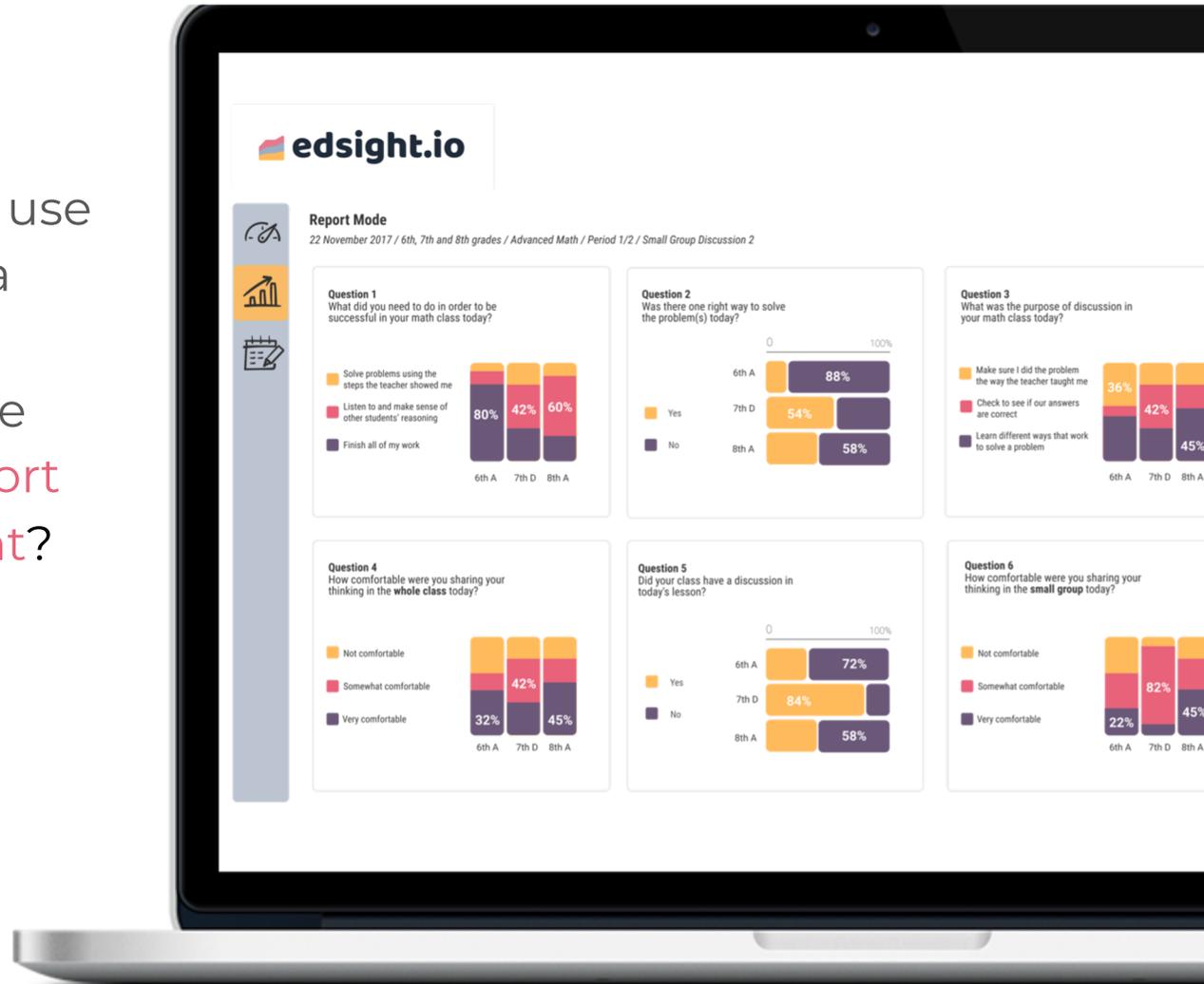


# Agenda

- Design dilemma
- Design principles
- Demo
- Case study 1: Sensemaking
- Case study 2: Designing for Privacy

# Dilemma

People are being asked to use data. How can we design a **reflection tool** to present these data and help people interact with data to **support inquiries and improvement?**



# Participatory **design-based research** with K-12 educators, organized in iterative cycles.

**Initial conjectures**

Learning Theories  
Problem of practice  
Needs analysis

**Build & test**

*re-conjecture*

**Build & test**

*re-conjecture*

**Build & test**

*re-conjecture*

...

**Theory**

**Design principles**

**New hypotheses**

*Tensions & insights*

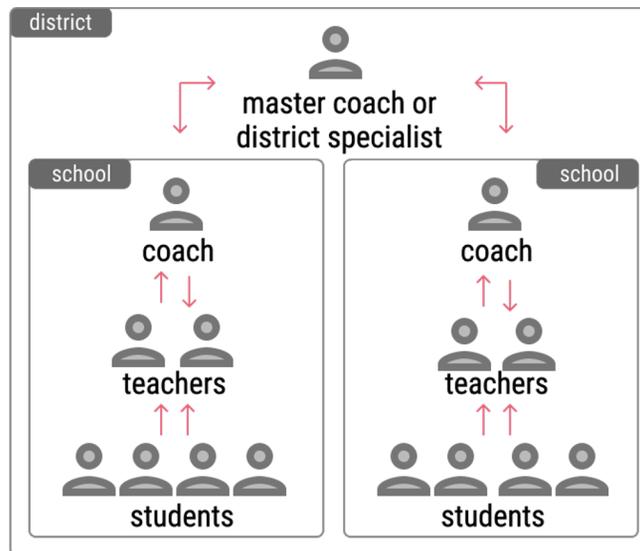
*Tensions & insights*

*Tensions & insights*

**Conjecture Mapping (Sandoval, 2014)**: a tool of DBR, allows researchers to systematically hypothesize the flow between material aspects of a design, mediating processes, and intended learning outcomes."

# A fundamentally social process

How data flows within our partner districts



Coach-facing dashboard displays teacher and school aggregates.



Coach-facing dashboard displays teacher aggregates.



Data is displayed in teacher-facing dashboard



Practical measurement survey is administered

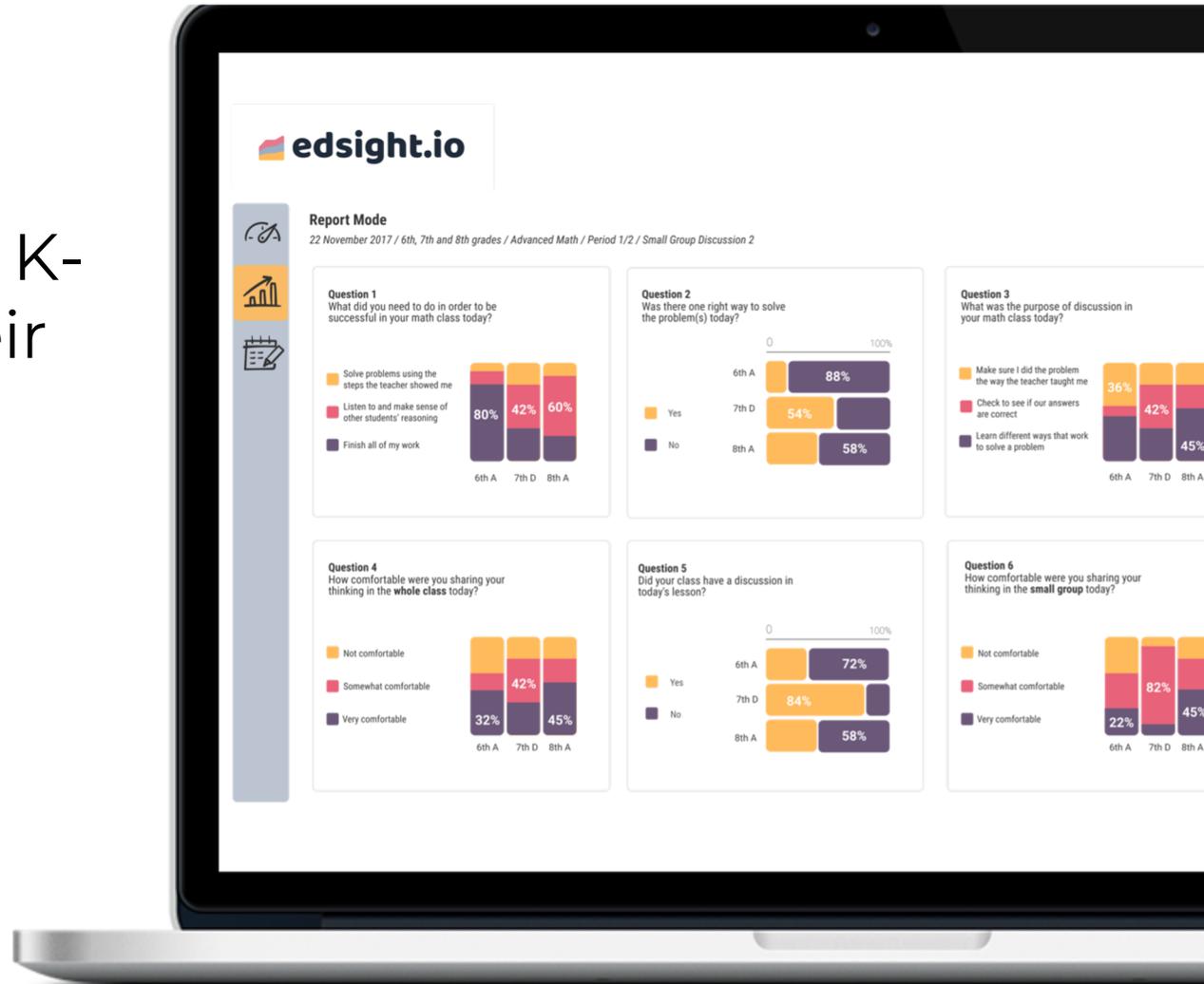
# Design Principles

- Needs to **fit current practices**, norms, and "rituals" (e.g., PD sessions).
- Respects and leverages **interpersonal relations** for data sensemaking and sharing.
- Dashboard as a way to spur **reflection and conversations**, not exert control and assessment.
- Not just designing a tool but also ways of using it



# Edsight

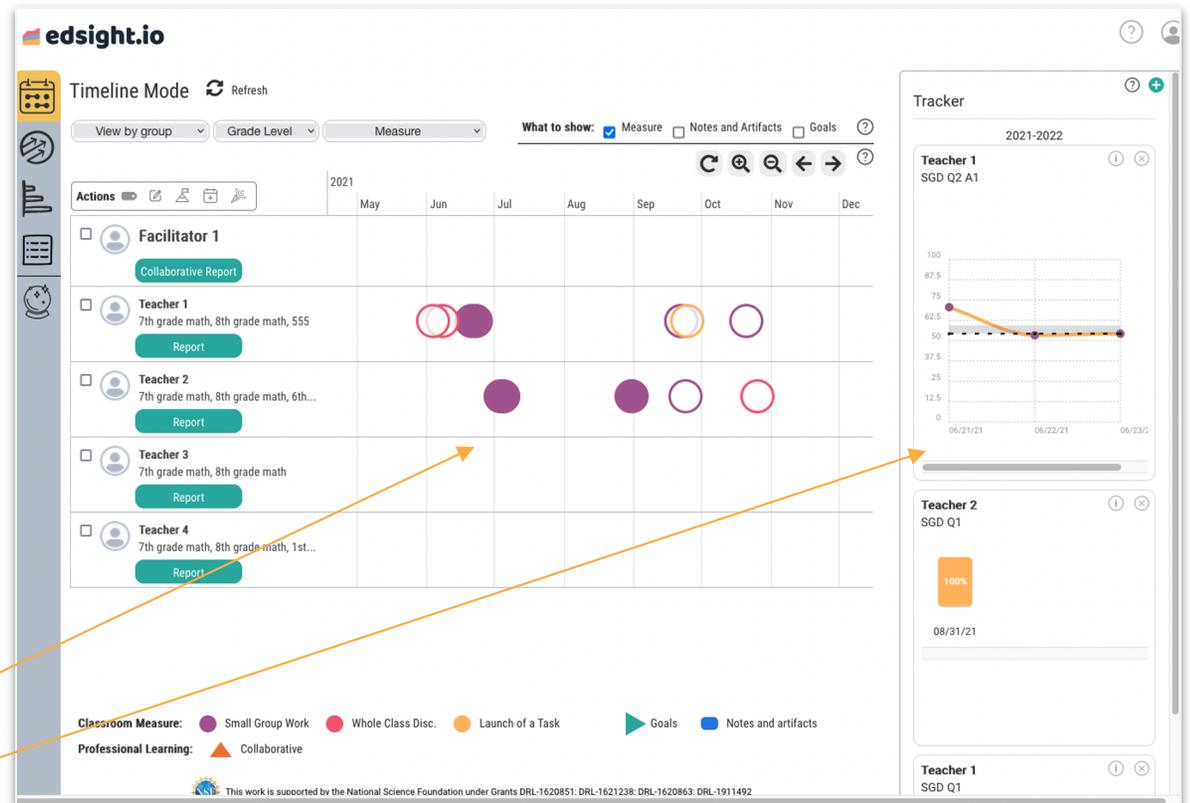
A reflection tool for K-12 teachers and their PD facilitators



# Timeline

Facilitators can see their data longitudinally (timeline), to further support the teachers they are working with.

Colored circles and trackers help facilitators make sense of their work with teachers.



# Keeping track of reflections

More than just numbers and graphs, educators can store notes, observations and artifacts to triangulate sensemaking efforts.

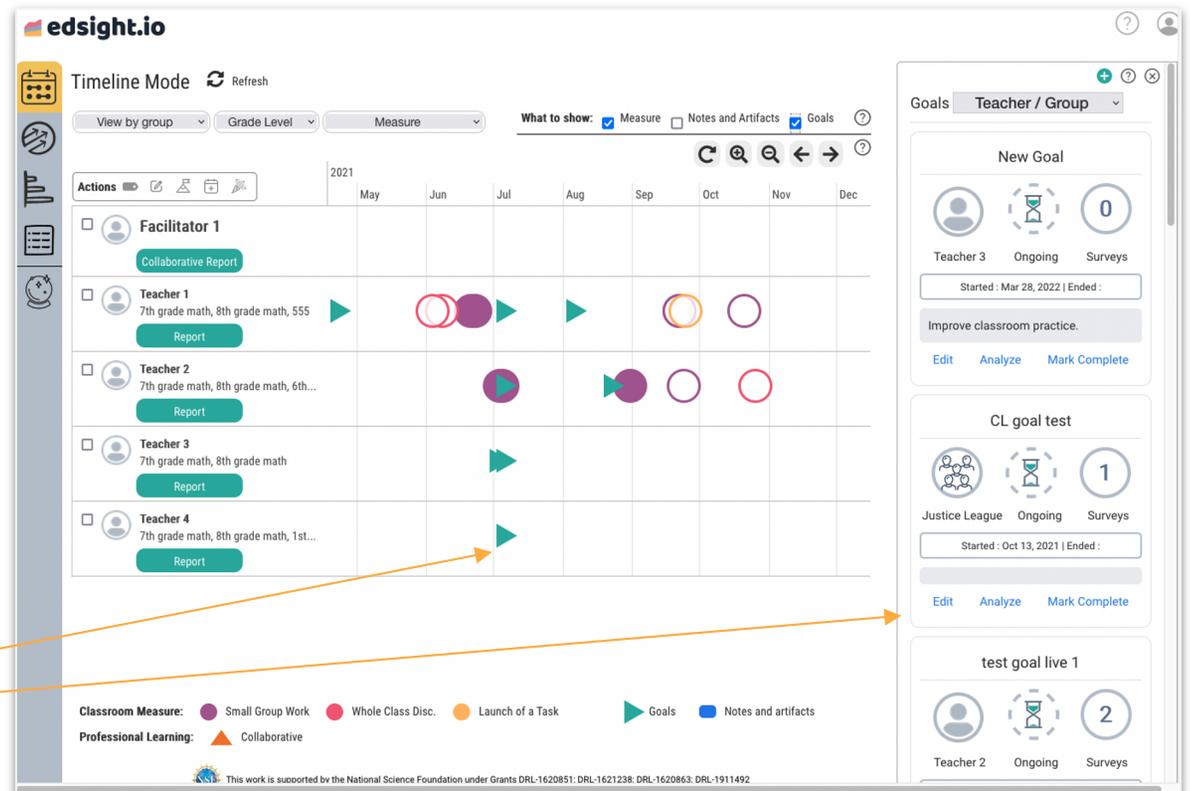
Blue squares indicate notes and artifacts on the timeline. On the right, a detailed view of one note.

The screenshot displays the Edsight.io interface in 'Timeline Mode'. The main area shows a calendar for 2021 with a list of users on the left: Facilitator 1, Teacher 1, Teacher 2, Teacher 3, and Teacher 4. Each user has a 'Report' button. The timeline shows various activities represented by colored circles and squares. A legend at the bottom identifies these symbols: Classroom Measure (Small Group Work, Whole Class Disc., Launch of a Task, Goals) and Professional Learning (Collaborative). A blue square on the timeline for Teacher 2 is highlighted, and a callout box shows a note titled 'Practice note after visit'. On the right, a 'Note & Artifact' panel provides a detailed view of this note, including the text 'I visited Mr X's class today and observed for 30min. After the class, the teacher and I had a debriefing meeting and talked about...', a date of 10/19/2021, and options to add artifacts like Handout, Student Work, Hand Written Notes, Photograph, Video, and Other. A URL is provided for linking an artifact. The panel also includes 'Save' and 'Delete' buttons.

# Goals

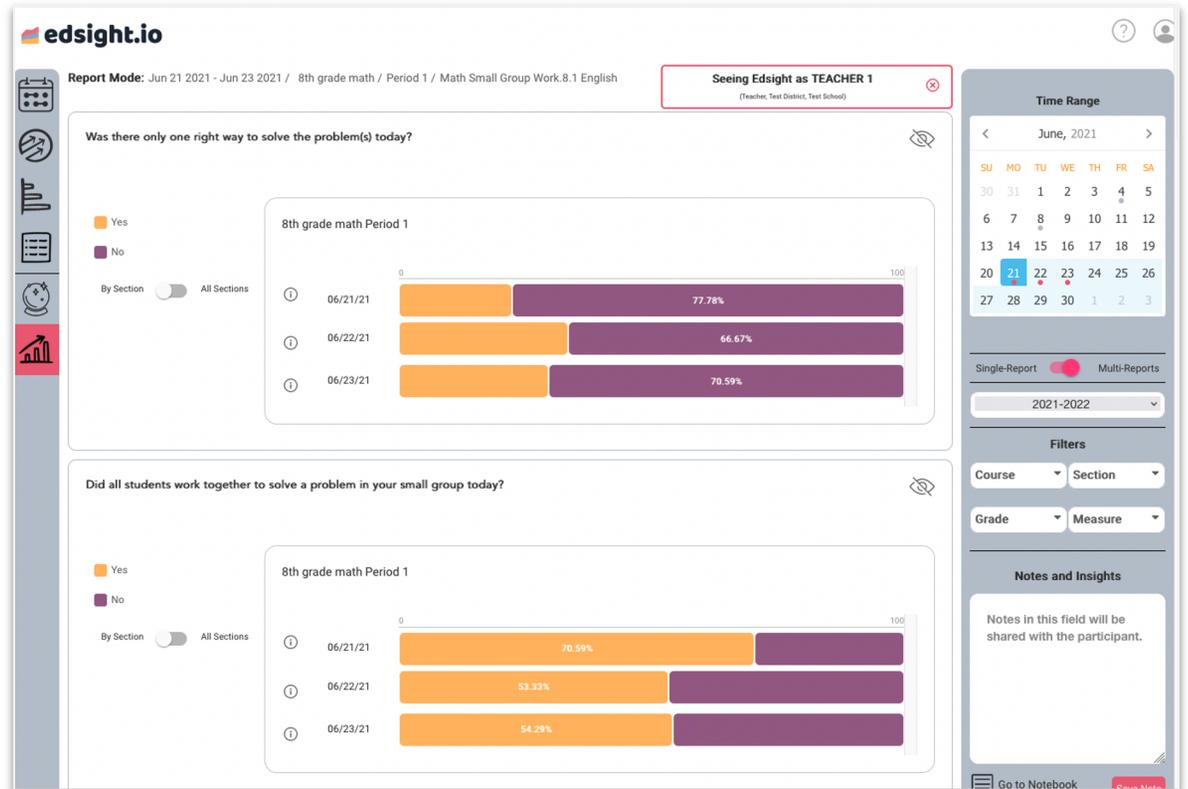
Facilitators and teachers negotiate and set goals based upon their interpretation of the data.

Triangles mark when goals have started. A list of goals can be seen on the right.



# Longitudinal Reports

Facilitators and teachers can access longitudinal reports of how students are experiencing various aspects of instruction. This feature opens space for educators' reflection over time.



# Case Study: Sensemaking

How do educators make sense of data visualizations?

Campos, F. C., Ahn, J., DiGiacomo, D. K., Nguyen, H., & Hays, M. (2021). **Making Sense of Sensemaking: Understanding How K-12 Teachers and Coaches React to Visual Analytics.** *Journal of Learning Analytics*, 8(3), 60-80.

We asked 18 educators to think aloud their instructional observations and decisions from data visualizations of the practical measures.

		Emotional (one code per excerpt)						Analytical (one or two codes per excerpt)															
		Satisfaction	Empathy	Distrust	Responsibility	Positive Surprise	Negative Surprise	No Response	Multiple Lenses	Attrib. of Cause	Judgement	Asking Questions	Comparing	Confirmation	Prediction	Confusion	Connecting Dots	Gap Filling	Part vs Whole	Recall	Re-Stating	No Response	
Analytical (one or two codes per excerpt)	Multiple Lenses					2	1	9															
	Attrib. of Cause	7	3	10	5	9	9	34	3														
	Judgement	1					4	4	1														
	Asking Questions	5	1	2		3	8	32	3	5	1												
	Comparing	3			1	1	5	8	1		4												
	Confirmation	1	1			2	2	7	7		2												
	Prediction	2	1			1		4	2	2	1												
	Confusion							2	10			3	2										
	Connecting Dots	4			1	2	4	18	4		9	1			1								
	Gap Filling	6		2		2	10	27	2	19	4	7	2			1	3						
	Part vs Whole	2				1		1							1		1	2					
	Recall		2	5	4	2	4	9	2	14		3		1	1		2	1					
	Re-Stating	5		1	1	1	3	31	1	5	2	6	1	1		4	6	5					
	No Response		1		1			5															
Intentional (one code per excerpt)	Action Intention	5	1	1	4	1	7	24	4	9	2	11	5	1	3	1	8	13	2	4	8	2	
	Planning						1	6	1	3		1					1	1		1	2	1	
	Seeking Info	2				3	1	16	2	3		17	1	1	1	1	5	3				3	2
	No Response	15	4	11	4	11	18	70	5	62	7	23	12	11	4	10	15	30	2	21	29	2	

Zero Co-Occurrences  
  4 to 6 co-occurrences  
  7 to 10 co-occurrences  
  11 to 14 co-occurrences  
  15+ co-occurrences

# Two ways of approaching dashboard data

generative uncertainty



over-fitting

Participants identified relevant aspects of instruction by **making connections** to other contexts and domains, and interpreting data points to **devise instructional plans**.

Participants focused on **attributing causes** and **recalling past events**.

## Generative Uncertainty

I **wonder about** what type of teaching is happening and who's doing the thinking. (...) I want to **go and ask some questions around instruction**. I might also want to go in and observe a class (Coach D)

## Overfitting

There wasn't much discussion from the students. (...) The whole thing that I've been trying to get is 'you did ratios and proportions, think unit rate, value of one item.' I had to clue them in as to what it was. But they heard [Student X] say it, and then they ... still didn't get it. (Teacher A)

# Case Study: Designing for Privacy

How do we help educators engage with data in reciprocal and transparent ways?

Ahn, J., Campos, F., Nguyen, H., Hays, M., & Morrison, J. (2021, April). **Co-designing for privacy, transparency, and trust in K-12 learning analytics.** In *LAK21: 11th International Learning Analytics and Knowledge Conference* (pp. 55-65).

Prototype 1 (baseline):  
"All or nothing"

2017 / 6th, 7th and 8th grades / Advanced 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?

- Solve problems using the steps the teacher showed me
- Listen to and make sense of other students' reasoning
- Finish all of my work

41

2%

Question 2

Was there one right way to solve the problem(s) today?

- Yes
- No

6th A

72%

- Yes
- No

6th A

72%

- Yes
- No

6th A

72%



### Manage Permissions

Your data is currently **not shared** with instructional coaches and Math leaders. Sharing your survey results might facilitate discussion and reflection.

Share my data and artifacts.

Keep it private and do not share anything for now.

[Save](#)

TIME RANGE

November 2017

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Aggregate  By Event

FILTERS

Grade Level  Course

Period/Block  Metric

QUESTIONS

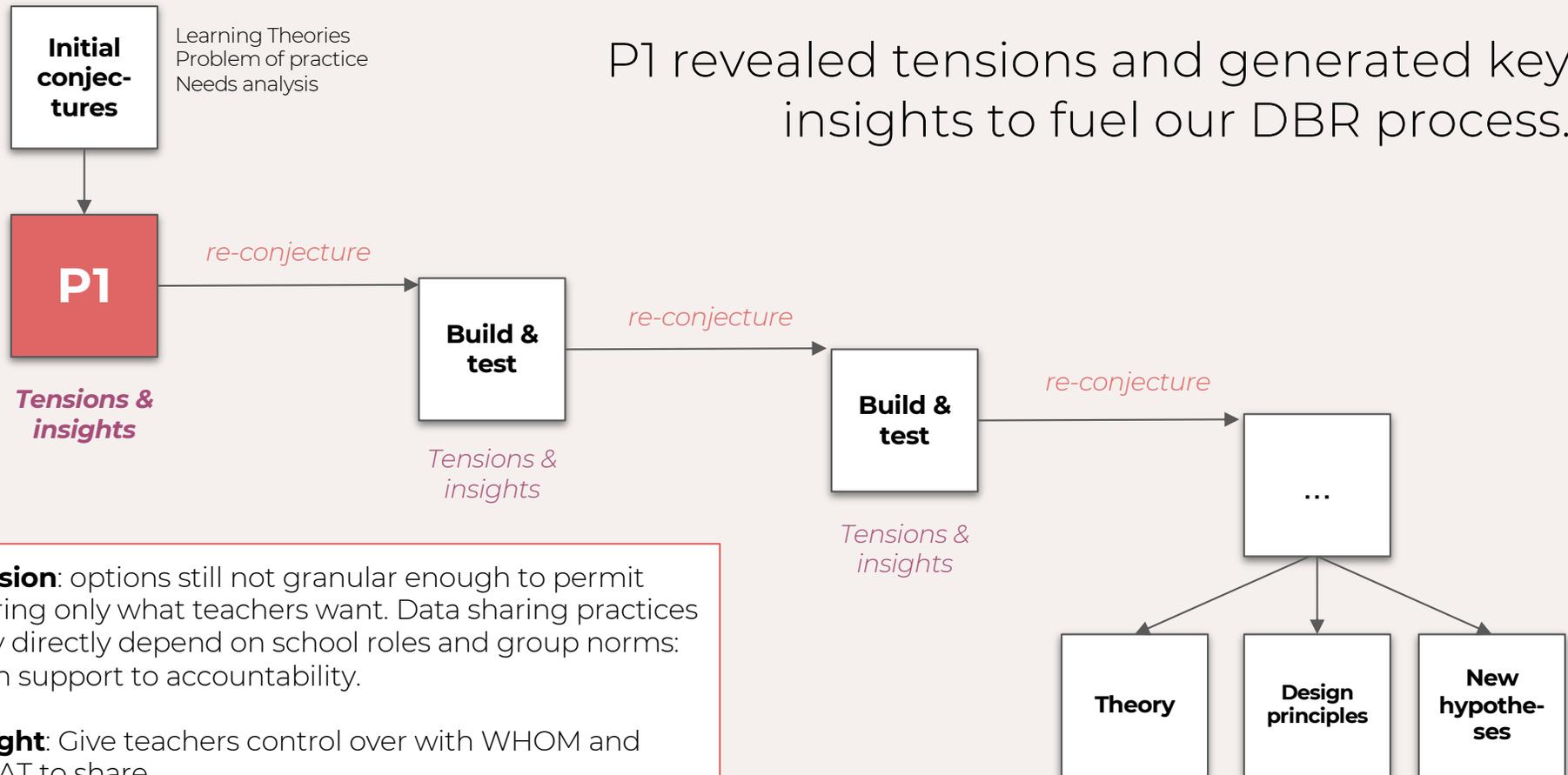
1 2 3 4 5 6

7 8 9 10 11 12

NOTES AND INSIGHTS

[Go to notebook](#) [save note](#)

P1 revealed tensions and generated key insights to fuel our DBR process.



**Tension:** options still not granular enough to permit sharing only what teachers want. Data sharing practices may directly depend on school roles and group norms: from support to accountability.

**Insight:** Give teachers control over with WHOM and WHAT to share.

# Prototype 2: "What and with Whom"

6th grades / Advanced 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?

- Solve problems using the steps the teacher showed me
- Listen to and make sense of other students' reasoning
- Finish all of my work

**Question 2**  
Was there one right way to solve the problem(s) today?



## Manage Permissions

Your data is currently **not shared** with instructional coaches and Math leaders. Sharing your survey results might facilitate discussion and reflection.

### Share with your coach:

- My survey results
- My artifacts (e.g. photos, handouts)

### Share with Math leader:

- My survey results (aggregated at grade level)

Save

### TIME RANGE

November 2017

Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
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Aggregate  By Event

### FILTERS

Grade Level  Course

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### QUESTIONS

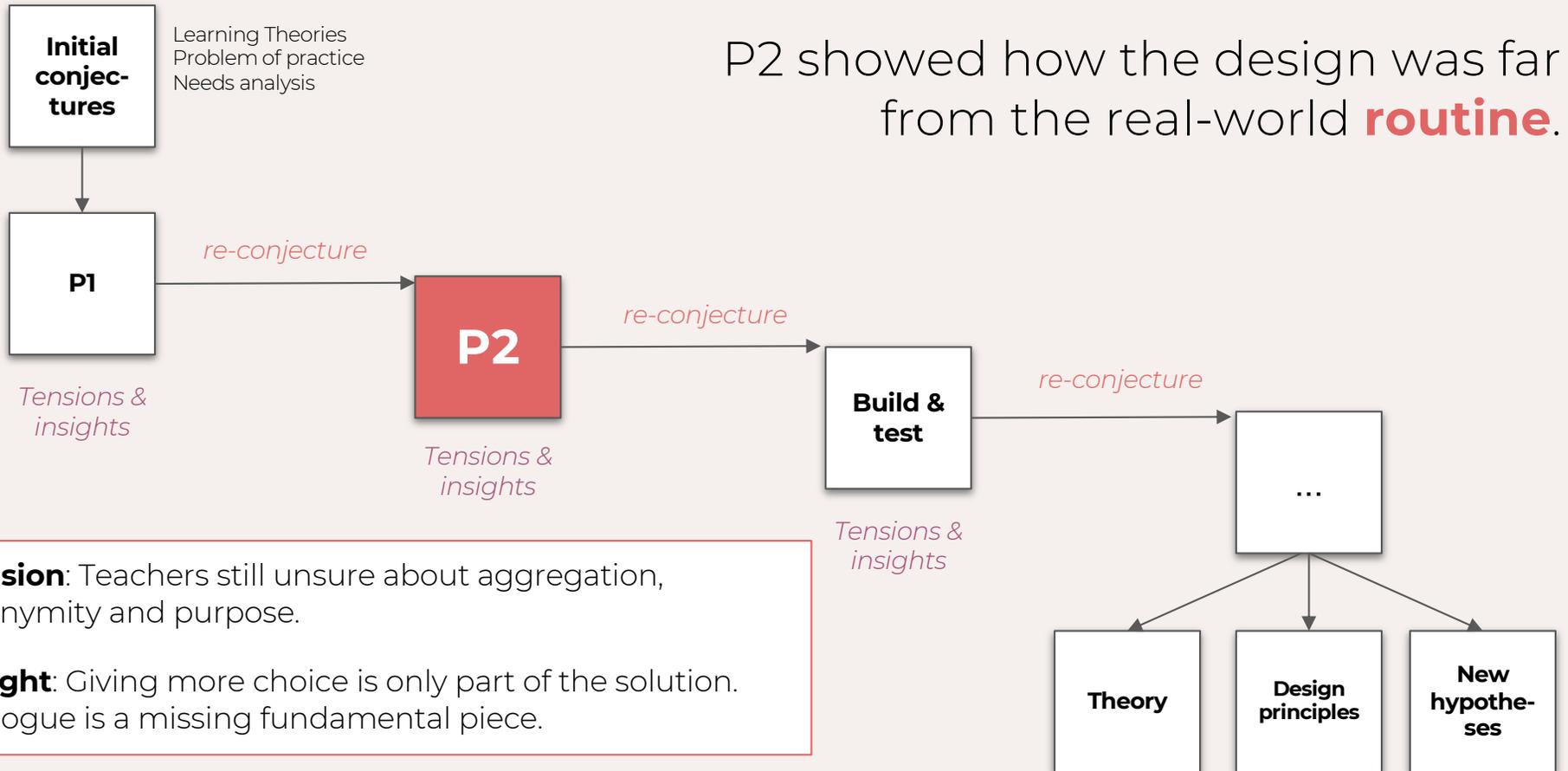
1 2 3 4 5 6

7 8 9 10 11 12

### NOTES AND INSIGHTS

Empty text area for notes and insights

Go to notebook



# P3: LEGITIMATING THE PROCESS

SPECIFIC REASON

SPECIFIC PERIOD



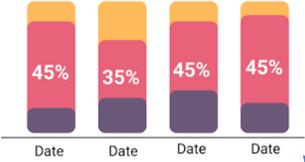
### New Data Initiative from Coach P

*"In the 2020-21 school year, I would like to work with you to make student thinking in Math visible. This will all end at the end of the 2021 school year, and your data will go back to being private."*

If you accept this request, this is an example of what Coach P will see:

Survey Type X, Question Z

- Response item 1
- Response item 2
- Response item 3



Date	Response item 1	Response item 2	Response item 3
Date	45%	35%	45%
Date	35%	45%	45%
Date	45%	35%	45%
Date	45%	35%	45%

Would you be willing to share your data with Coach P?

### Manage Data Initiatives

Initiative	Who	Duration	Format/Identifiability	Description	Share?
Math thinking	Coach P	2019-2020 school year	Same as you see this data	"Make student Math thinking visible."	<input type="button" value="NO"/> <input checked="" type="button" value="YES"/>
Math thinking	District XYZ	2019-2020 school year	Aggregated at school level	"Make student Math thinking visible."	<input type="button" value="NO"/> <input checked="" type="button" value="YES"/>
Student engagement	Coach B	Jan-Jun 2020	Same as you see this data	"Increase student engagement in..."	<input type="button" value="NO"/> <input checked="" type="button" value="YES"/>

SPECIFIC OUTPUT

CHOICE

Yes  
No



Yes  
No

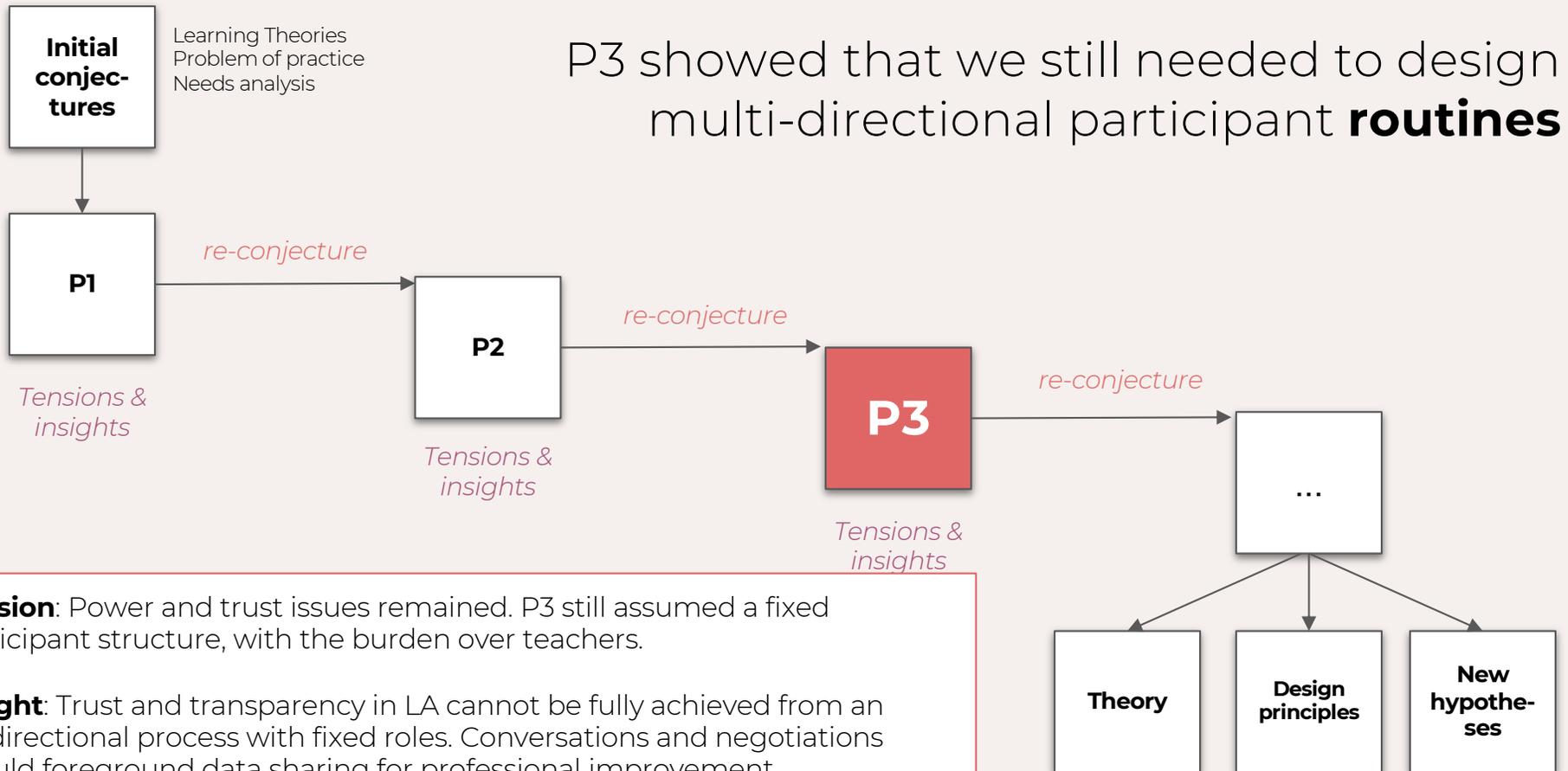


Yes  
No



Go to notebook

save note



Prototype 4:  
"Multi-directional sharing"

22 November 2017 / 6th, 7th and 8th grades / Advanced Math / Period 1/2 / Small Group Discussion 2



**New Data Initiative from Coach P**  
*"In the 2020-21 school year, I would like to work with you to make student thinking in Math visible. This will all end at the end of the 2021 school year, and your data will go back to being private."*

If you accept this request, this is an example of what Coach P will see:



### Data Sharing

School  Grade

Shared with me **My data**

Who	Duration	Initiative	Data Type	Message
<b>Pending</b>				
Kurt Wagner	2019-2020 school year	Train new teachers	<input type="checkbox"/> Survey results <input type="checkbox"/> Artifacts	
<b>Current</b>				
District X	2019-2020 school year	Increase discussion about Math concepts	<input checked="" type="checkbox"/> Survey results (aggregated at school level)	I prefer not to share this data yet because I am new to the school.
Scott Summers	2019-2020 school year	Notice student thinking	<input checked="" type="checkbox"/> Survey results <input checked="" type="checkbox"/> Artifacts	

Shared 
  Not Shared 
  Pending

Share your data 
  Request data

6th A 72% No 6th A 72% No 6th A 72%

Go to notebook save note

# Takeaways

- There's a need to promote **reciprocal transparency** between learning analytics stakeholders (Slade & Prinsloo, 2013).
- Users share more if they see value in it. Mostly, if they see an opportunity for professional development. It's not just about giving more choices, more boxes to tick, but creating value.