Learning Analytics

Jared Stein
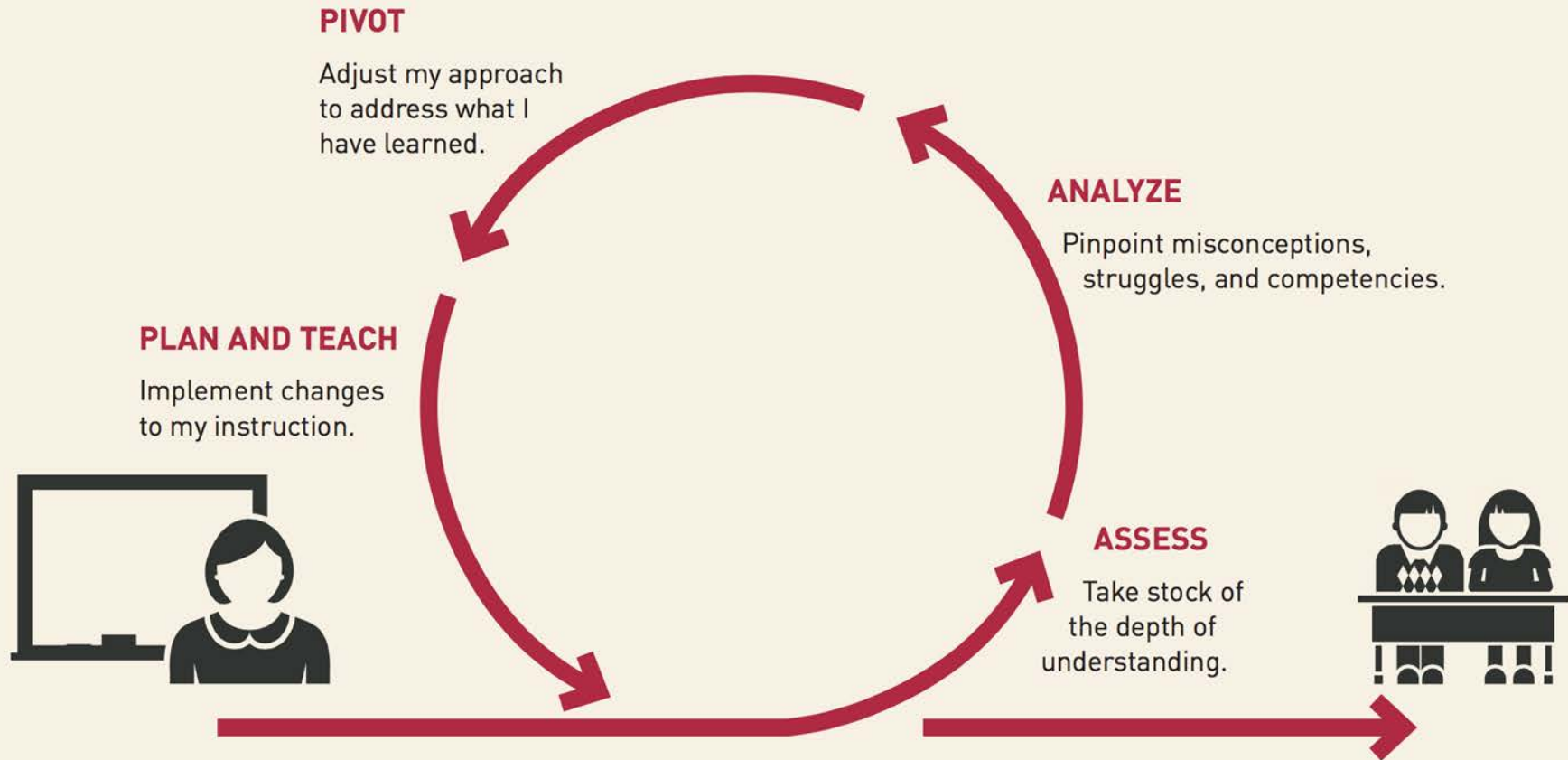VP Research, Instructure

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CYCLES OF DATA COLLECTION DRIVE EFFECTIVE INSTRUCTION

PIVOT

Adjust my approach to address what I have learned.

ANALYZE

Pinpoint misconceptions, struggles, and competencies.

PLAN AND TEACH

Implement changes to my instruction.

ASSESS

Take stock of the depth of understanding.

source: Teachers Know Best: Making Data Work for Teachers and Students, June 2015, Gates Foundation

What are Teachers Saying

What's going wrong? What's my next step as an instructor? What's the cause?

Brian M. – Writing, U. Mass

5 – 10 students per class don't matriculate. Reasons often reside outside of classroom.

Scott R. – Intro to Med, U. of Indiana

I hate using my time inefficiently. Why waste my time when students don't use feedback?

Kirsten M. – Probability & Stats., Kaplan

What are Teachers Saying

- More than 8 in 10 are constantly looking for ways to engage students based on who they are
- Nearly 8 in 10 teachers believe that data help validate where their students are and where they can go
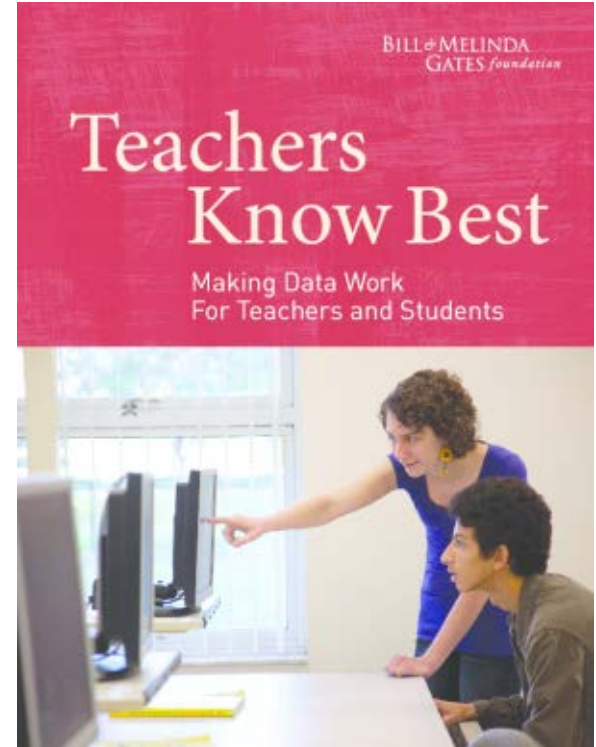
source: Teachers Know Best: Making Data Work for Teachers and Students, June 2015, Gates Foundation

A Few Examples

Courtesy of Utah State U.
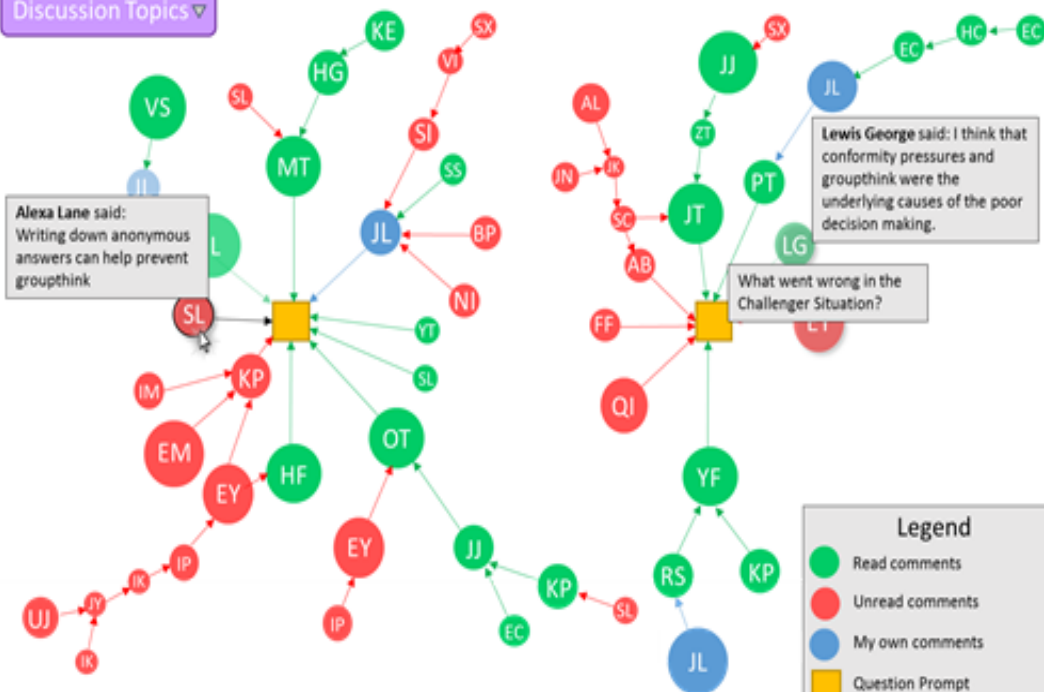
2015 assignment submission activities in relation to assignments due time

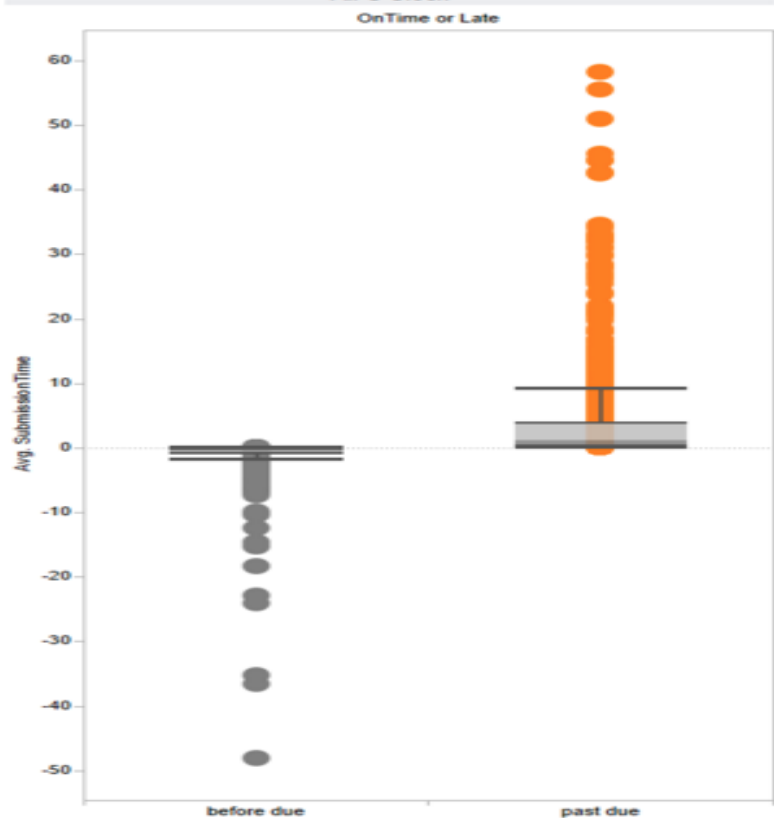| 2015 Assignment Submissions	Weekly Submissions	Hourly Submissions	Without Outliers

The average submission time in comparison to assignment due time at All O'clock
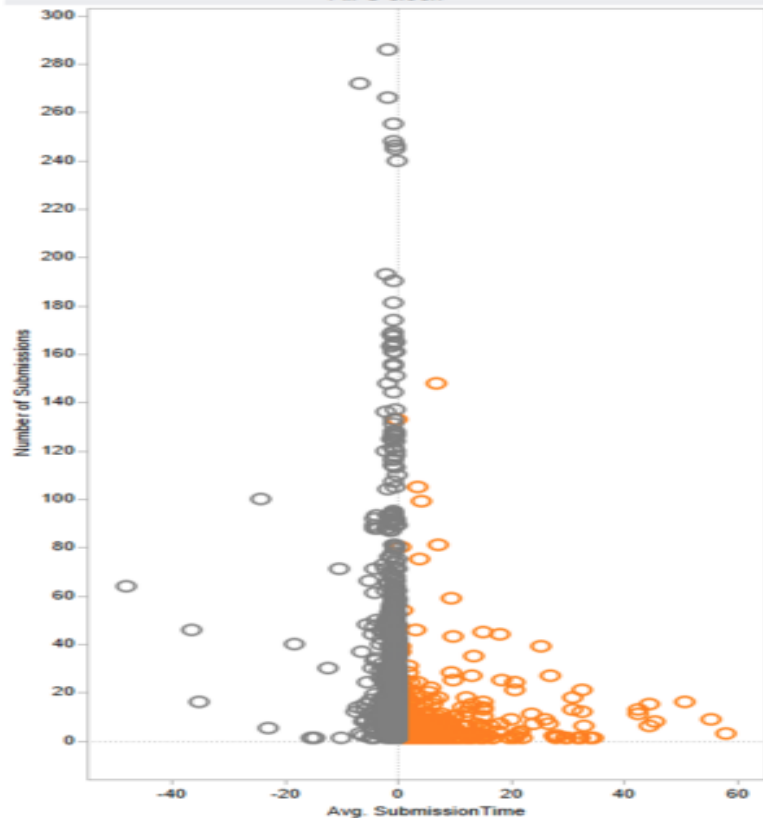
The average submission time in comparison to assignment due time at All O'Clock

OnTime or Late

Month of Due Date
- ☑ January
- ☑ February
- ☑ March
- ☑ April
- ☑ May
- ☑ June
- ☑ July
- ☑ August
- ☑ September
- ☑ October
- ☑ November
- ☑ December
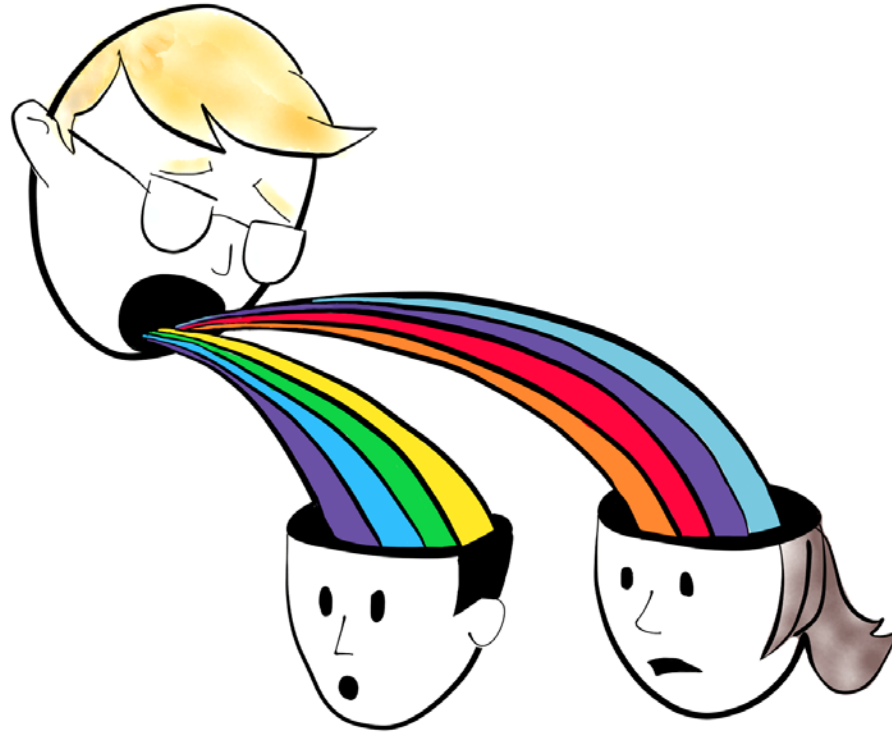
OnTime or Late
- ▪ before due
- ▪ past due

DueHour
- ☑ 0
- ☑ 1
- ☑ 2
- ☑ 4
- ☑ 5
- ☑ 6
- ☑ 7
- ☑ 8
- ☑ 9
- ☑ 10
- ☑ 11
- ☑ 12
- ☑ 13
- ☑ 14
- ☑ 15
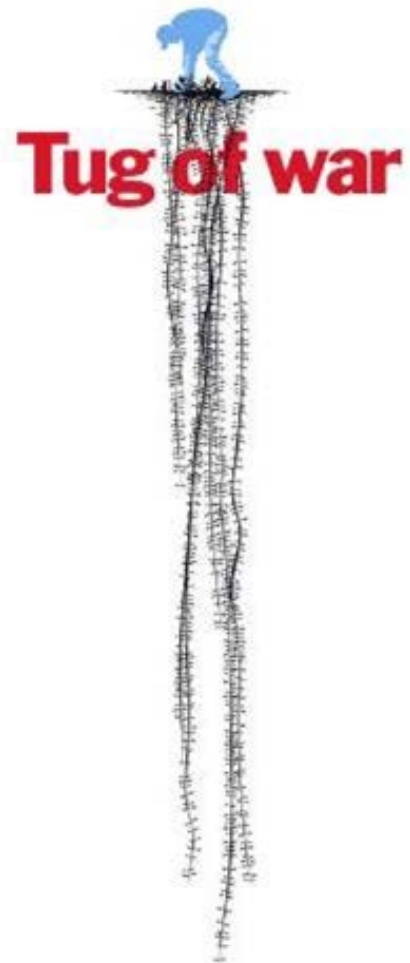- ☑ 16
- ☑ 17
- ☑ 18
- ☑ 19
- ☑ 20
- ☑ 21
- ☑ 22
- ☑ 23

Challenges

- Multi-mode course delivery: can useful analytics exist that apply to all course modes?
- How is our understanding of student learning limited by data generated in any given educational model?
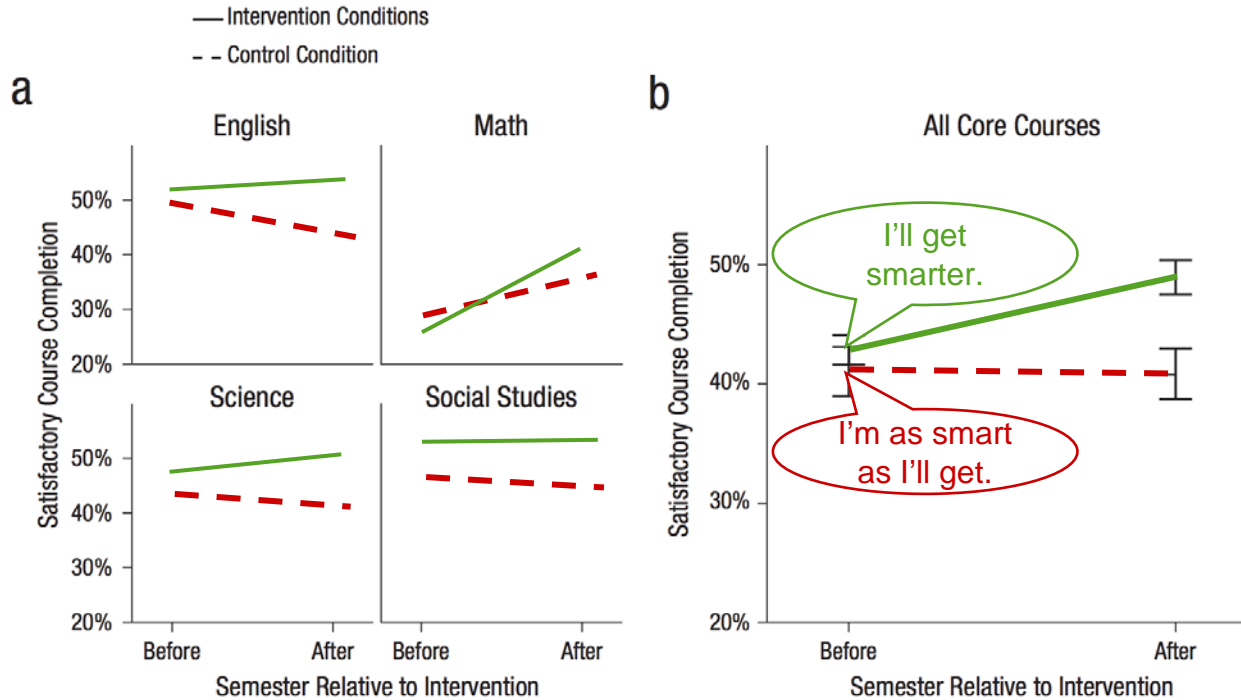
Teaching ≠ Learning

CC By-NC

Tug of war

"The fullest representations of humanity show people to be **curious, vital, and self-motivated.**"

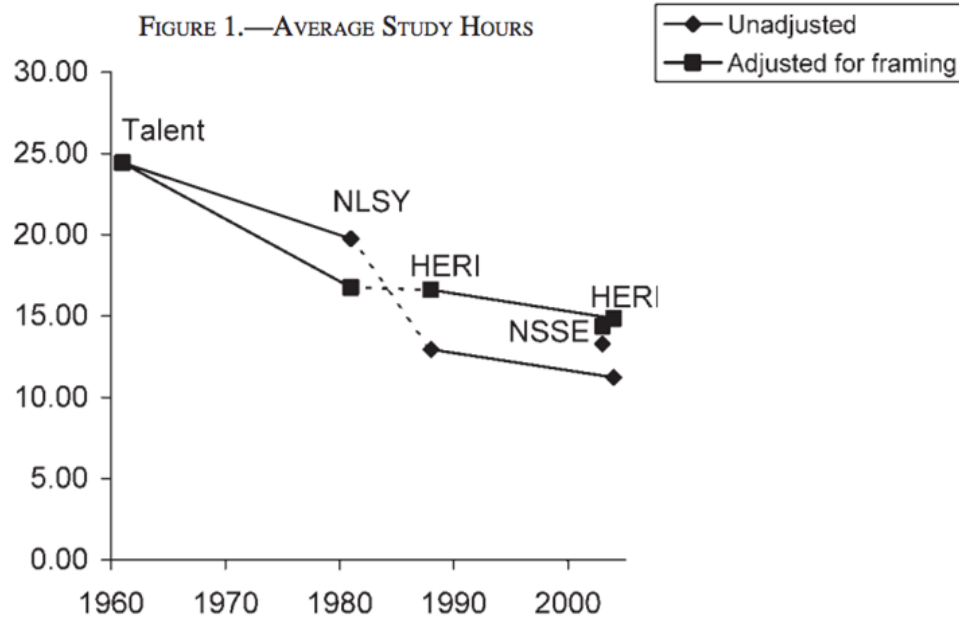Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68.

Can analytics target mindsets?

Paunesku, D., Walton, G. M., Romero, C., Smith, E. N., Yeager, D. S., & Dweck, C. S. (2015). Mind-set interventions are a scalable treatment for academic underachievement. Psychological science, 0956797615571017.

Can analytics increase time-on-task?

FIGURE 1.—AVERAGE STUDY HOURS

- ◆ Unadjusted
- ■ Adjusted for framing

Talent
NLSY
HERI
HERI
NSSE

FOR HOMEWORK I WANT YOU TO READ CHAPTER 4

IN OTHER WORDS, NO HOMEWORK

Babcock, P., & Marks, M. (2011). The falling time cost of college: Evidence from half a century of time use data. *Review of Economics and Statistics*,*93*(2), 468-478.

"The greater the effort to retrieve learning, provided that you succeed, the more learning is strengthened by retrieval."
Dunlosky et al

TESTING EFFECT

SPACED RETRIEVAL
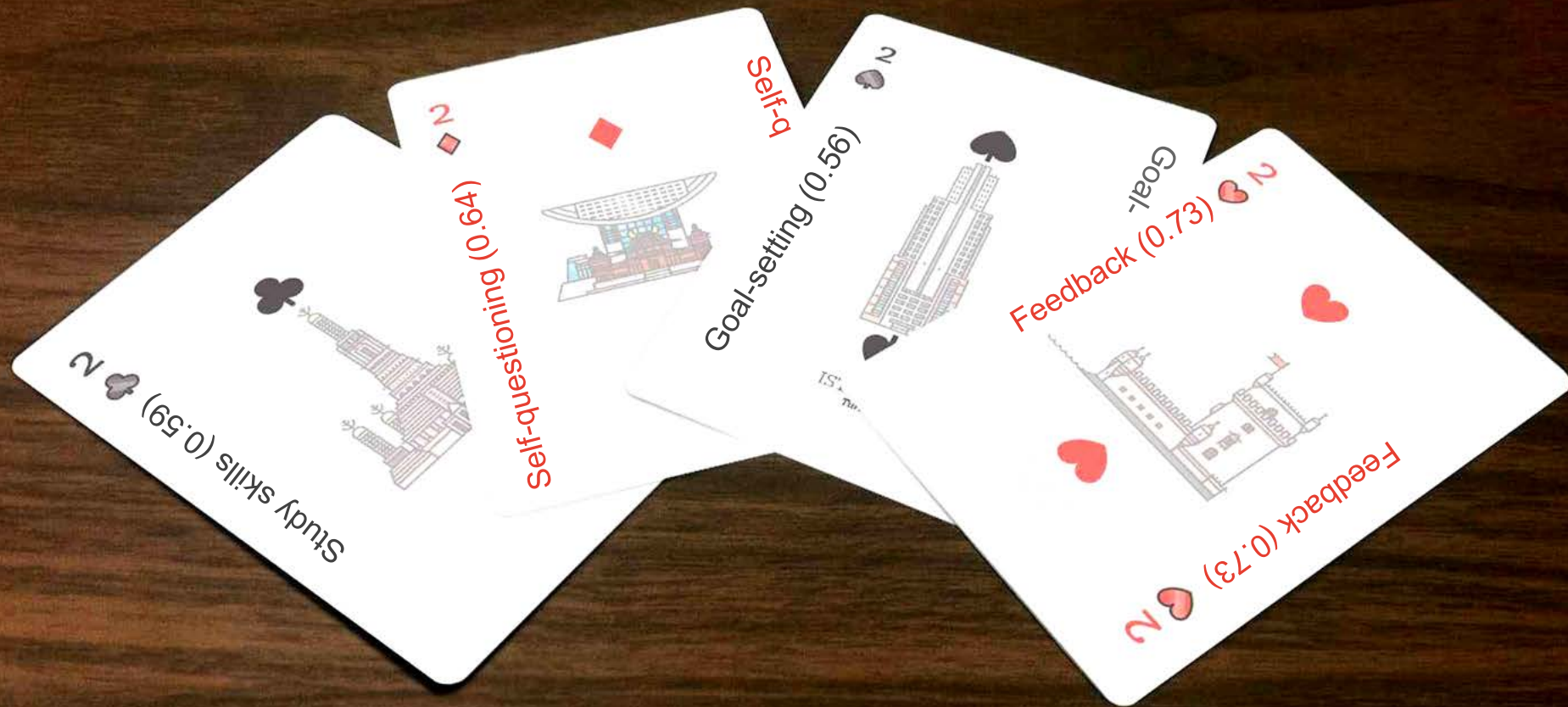
Study skills (0.59)

Self-questioning (0.64)

Self-q...

Goal-setting (0.56)

Goal-...

Feedback (0.73)

Feedback (0.73)

Hattie, J. (2009). Visible learning: A synthesis of over 800 meta-analyses relating to achievement. Routledge.
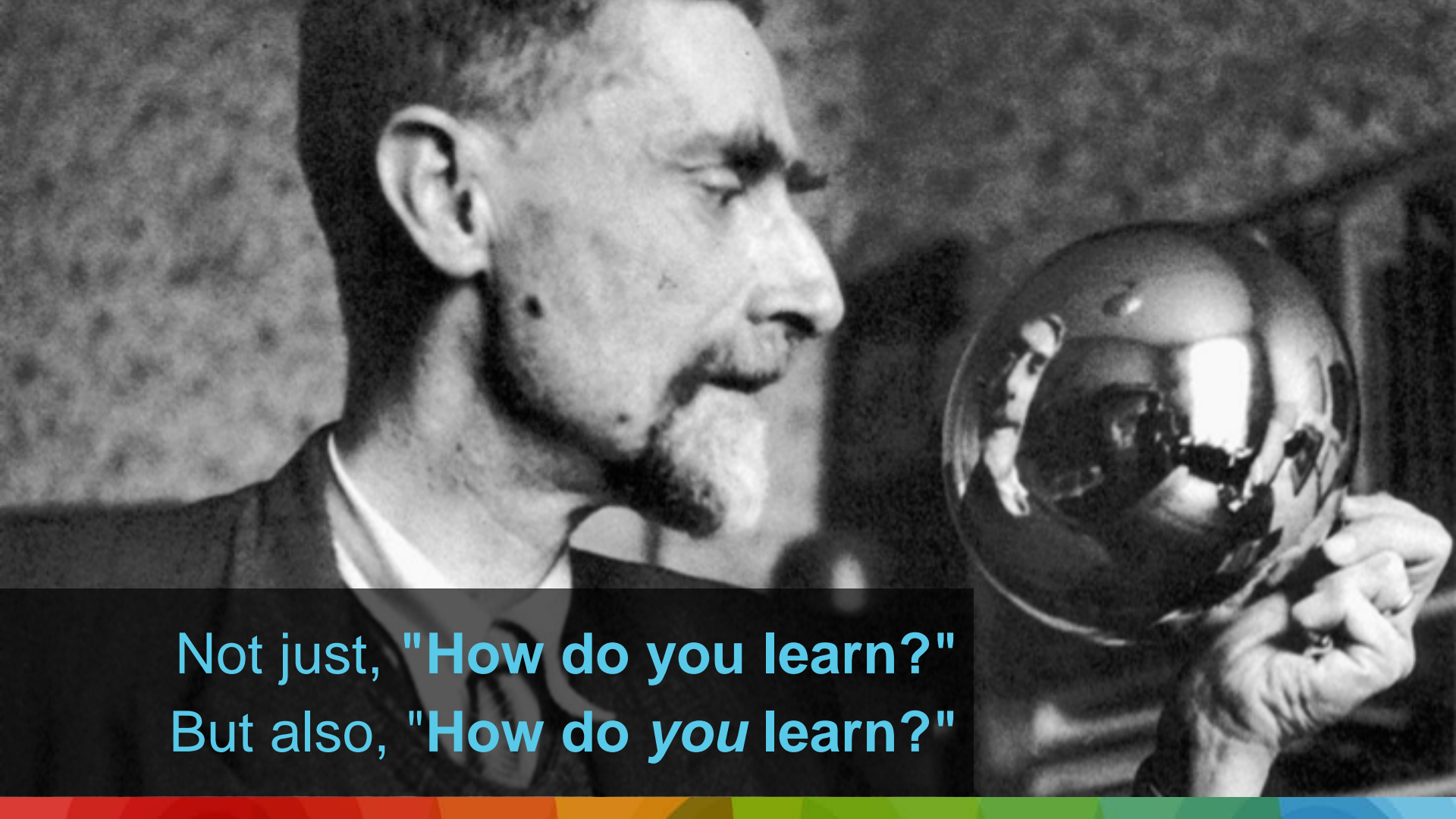
Not just, **"How do you learn?"**
But also, **"How do *you* learn?"**

"…**self-monitoring has direct impact** on the level and quality of study and therefore, **overall learning progression and academic achievement**"

Dunlosky & Thiede, 1998

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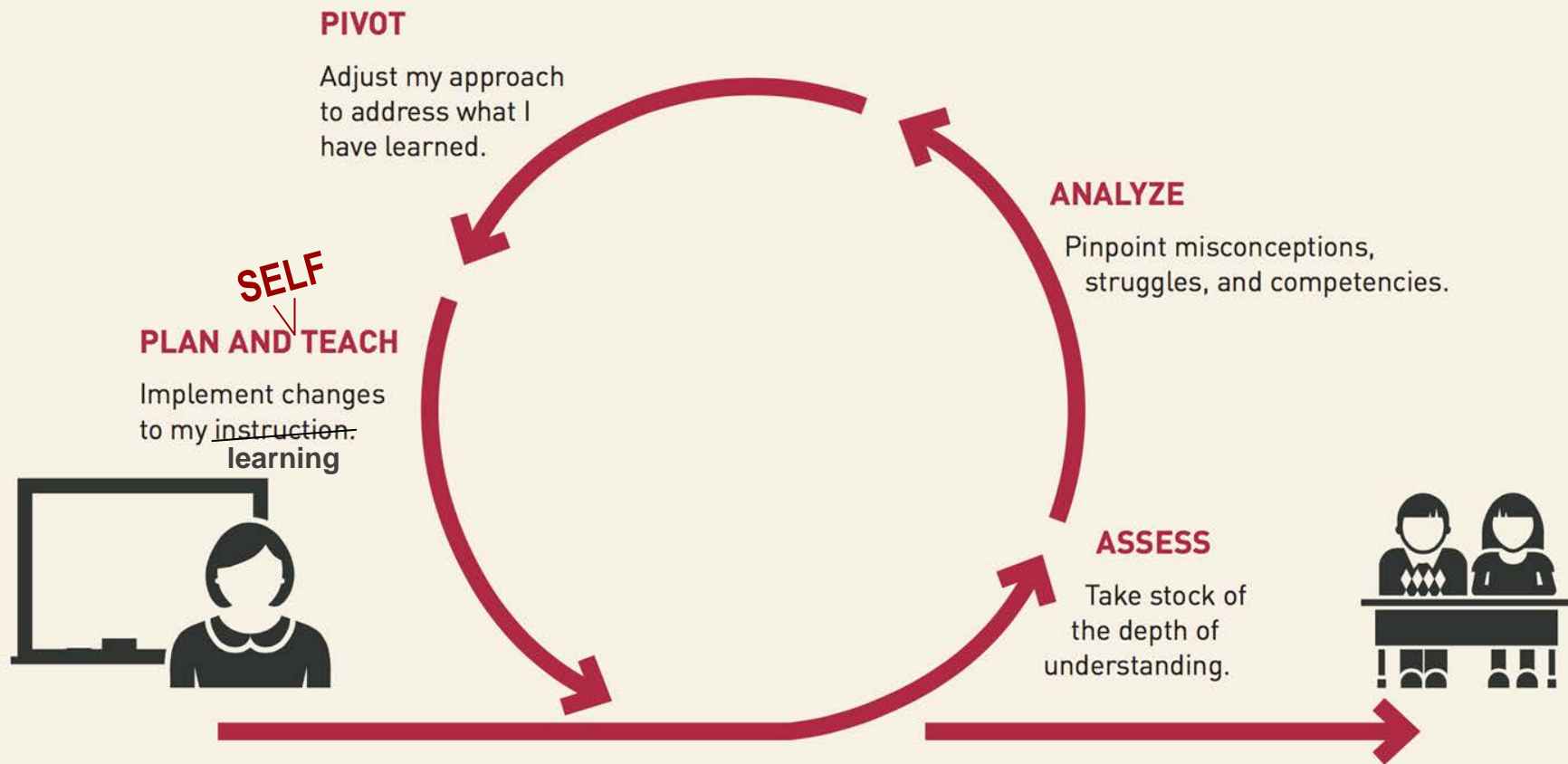
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CYCLES OF DATA COLLECTION DRIVE EFFECTIVE INSTRUCTION

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"Present [analytics] as a guide for sense-making that can **empower students** to take responsibility for regulating their own learning processes."
Wise, Zhao, Hausknect (2013)

ASSESS

Take stock of
the depth of
understanding.

Gates Foundation. (2015). Teachers Know Best: Making Data Work for Teachers and Students.

Can we treat **causes**? Can our students?

Things analytics won't affect

Institutional commitment

High school academic experience

Finances / socio-economics

Things analytics might affect

Goal-setting

Mindset, motivation

Learning habits / academic skills

Metacognition, reflection

e.g. Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. Psychological Bulletin, 130(2), 261–288.
Lotkowski, V. a, Robbins, S. B., & Noeth, R. J. (2004). The Role of Academic and Non-Academic Factors in Improving College Retention.

BREAKOUT TOPICS

TEACHERS & ANALYTICS

What are the most important, pressing questions that instructors have about courses they teach?

What data is required to answer these questions?

ROOM 309

STUDENTS & ANALYTICS

What do students need to know about their own learning to improve their learning habits?

How do we present this data to them so that they will want to use it?

ROOM 308

APPENDIX

REFERENCES

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Wise, Alyssa Friend, Yuting Zhao, and Simone Nicole Hausknecht. "Learning Analytics for Online Discussions : A Pedagogical Model for Intervention with Embedded and Extracted Analytics." In Proceedings of the Third International Conference on Learning Analytics And Knowledge - LAK '13, 48–56. Leuven, Belgium, 2013.