Making Change for Good

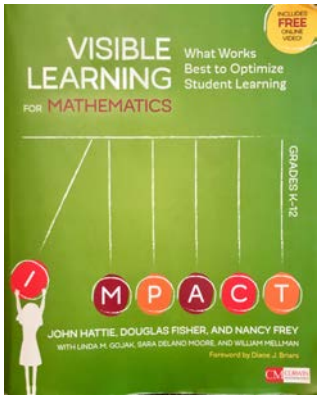
Using Language, Discourse, and the CRA Approach to Foster Math Understanding!

James Burnett
Founder / CEO

@jamesburnett69

ORIGO EDUCATION

John Hattie, et al. (2017). ***Visible Learning for Mathematics: What works best to optimize student learning.*** Thousand Oaks, CA: Corwin.



@jamesburnett69

ORIGO EDUCATION

Visible Learning*

Hattie's goal was to combine findings from different studies around the globe to identify patterns that can inform practice.

- Database of more than 70,000 studies
- Including 300 million students

* John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Making Change for Good!

Fostering mathematical understanding with:

1. Language
2. Discourse
3. The CRA approach

@jamesburnett69

ORIGO EDUCATION

The Science of Learning

Students learn new ideas by reference to ideas they already know.

Bransford, J.D. et al. (2000). *How People Learn: Brain, Mind, Experience and School*. Washington, DC: National Academy Press

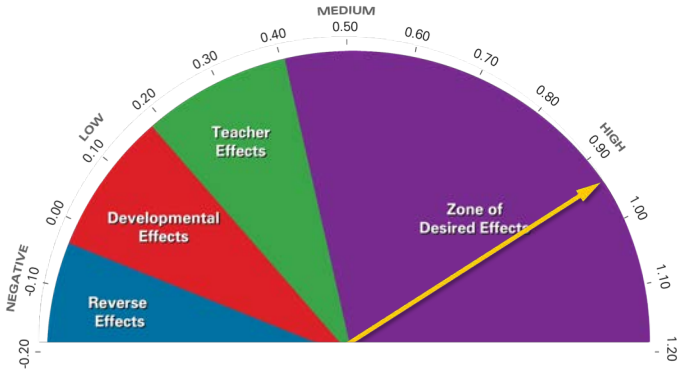
Cited in Deans for Impact (2015). *The Science of Learning*. Austin, TX

www.deansforimpact.org

@jamesburnett69

ORIGO EDUCATION

The Barometer of Influence* for ***Integrating learning with Prior Knowledge***



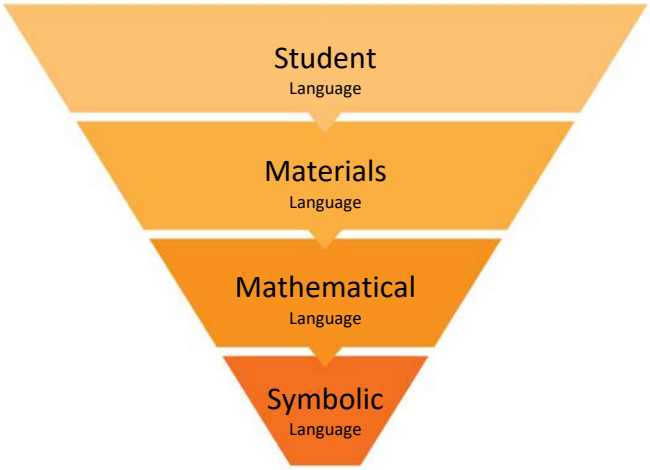
* John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Language Development

Words → Symbols



@jamesburnett69

ORIGO EDUCATION

Language Development

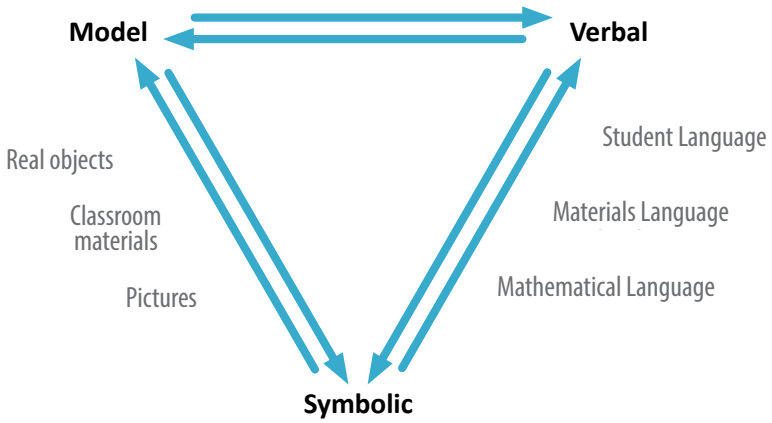
8	spend	5	leaves	3
8	take	5	is	3
8	subtract	5	equals	3

8 – 5 = 3

@jamesburnett69

ORIGO EDUCATION

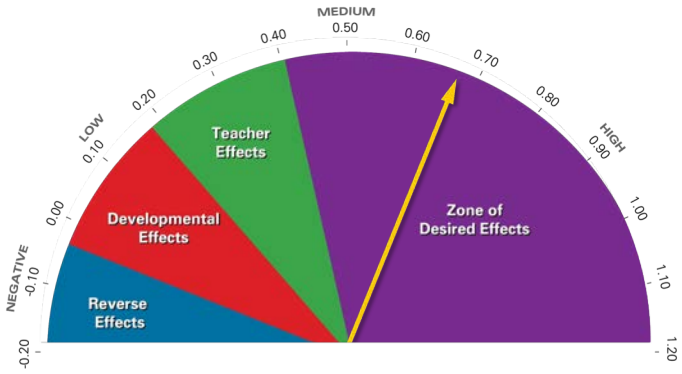
The ORIGO Teaching Model*



*Adapted from Ed Rathmell and Joseph Payne.

ORIGO EDUCATION

The Barometer of Influence* for ***Vocabulary Programs***



* John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Why Discourse?

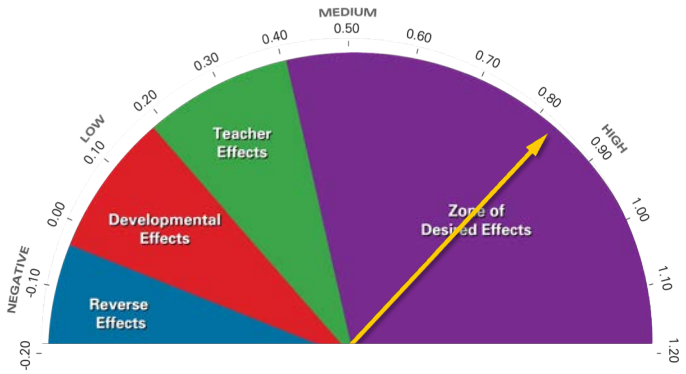
It is through discourse that students **internalize** new mathematical ideas as they **connect prior knowledge to new knowledge**, as well as recognize the need to reconceptualize certain ideas as they determine what they do not know.

Fuson, K.C., Kalchman, M., & Bransford, J.D. (2005). *Mathematical Understanding: An Introduction*. In M.S. Donovan, & J. Bransford (Eds.), How Students Learn Mathematics in the Classroom (pp. 217-256). Washington DC: NRC

@jamesburnett69

ORIGO EDUCATION

The Barometer of Influence* for ***Classroom Discussion***



* John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Building Classroom Discourse

1. Teacher **questioning** and **prompts** support students in building understanding based on previous knowledge and making connections rather than the teacher being the authority.

John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Building Classroom Discourse

2. **Mistakes are valued** and seen as opportunities for students to clarify their ideas through discussing and justifying their thinking and listening to the ideas of their peers.

John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Building Classroom Discourse

3. There is an element of **productive struggle** among students that is accompanied by **perseverance**, so that the focus is on how students are going to use mathematics to make sense of the task and how to approach a solution path.

John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Building Classroom Discourse

4. Students are encouraged to use a **variety of representations** to build understanding and justify their thinking.

John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

Piaget

Described four stages of learning

1. Sensorimotor (birth to age 3)
2. Preoperational (ages 3-7)
3. Concrete operational (ages 7-12)
4. Formal operational (ages 12 to adulthood)

@jamesburnett69

ORIGO EDUCATION

The Make-Ten Addition Strategy

STAGE 3: Manipulations Become Mental Images

If you have a strategy to calculate

9 + 5 = ___

then use the same thinking to calculate

29 + 15 = ___

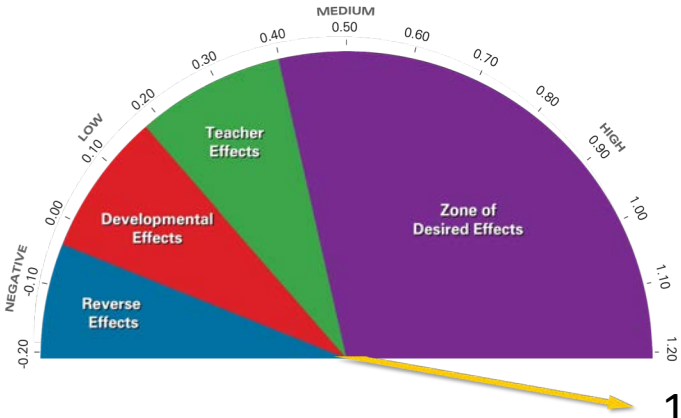
398 + 56 = ___

1.95 m + 2.45 m = ___

@jamesburnett69

ORIGO EDUCATION

The Barometer of Influence* for ***Piagetian Programs***



1.28

* John Hattie, et al. (2017). *Visible Learning for Mathematics: What works best to optimize student learning.* Thousand Oaks, CA: Corwin Mathematics.

@jamesburnett69

ORIGO EDUCATION

change 4 GOOD

1. Implement a "spaced" approach to learning content over time
2. Adopt a Piagetian approach to teaching concepts and skills
3. Develop mathematical language/vocabulary
4. Foster discourse in mathematics

@jamesburnett69

ORIGO EDUCATION

Thank You

Follow …… @jamesburnett69

Like ……. jburnett69

Connect ……. jburnett-origo

ORIGO EDUCATION