# Learning and Analytics, Centered around Evidence

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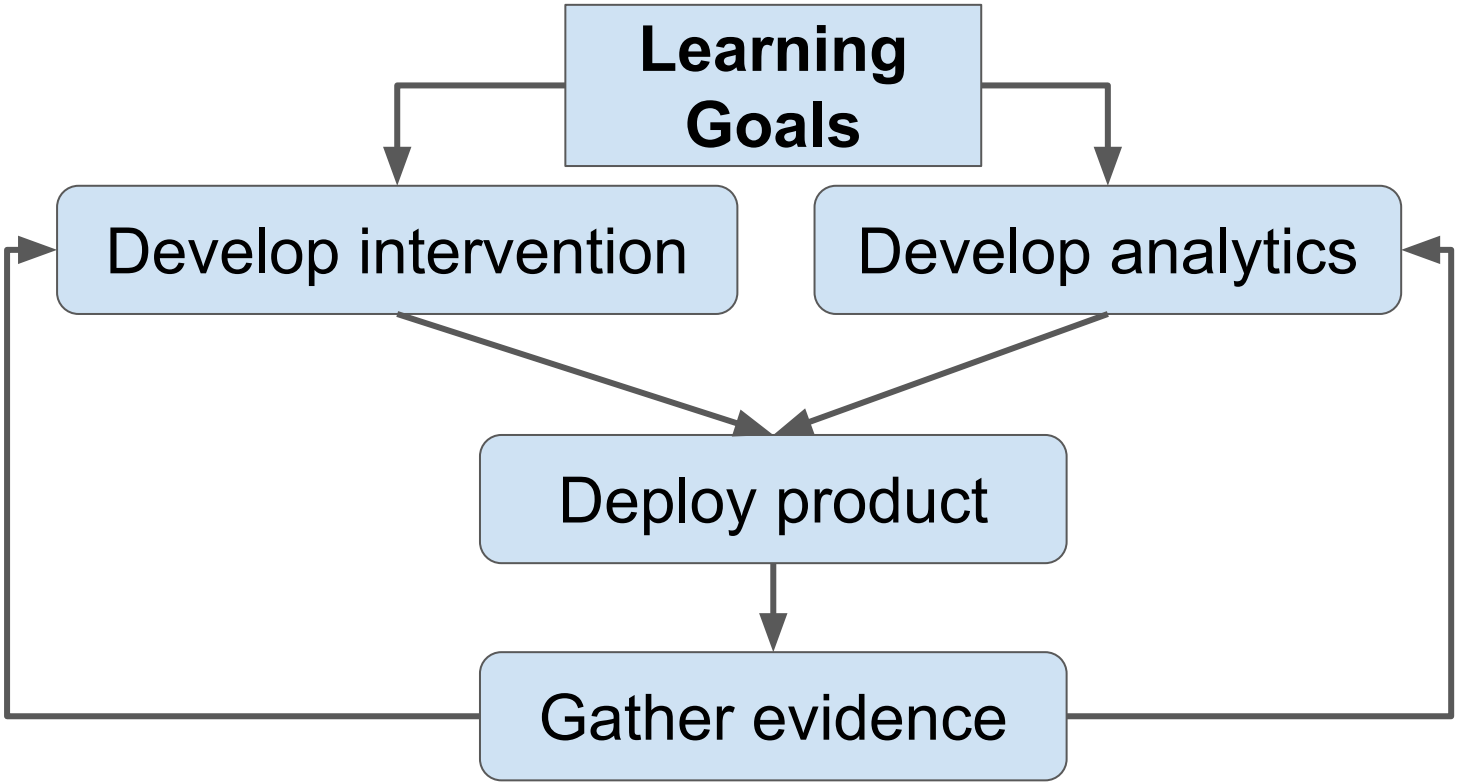
THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

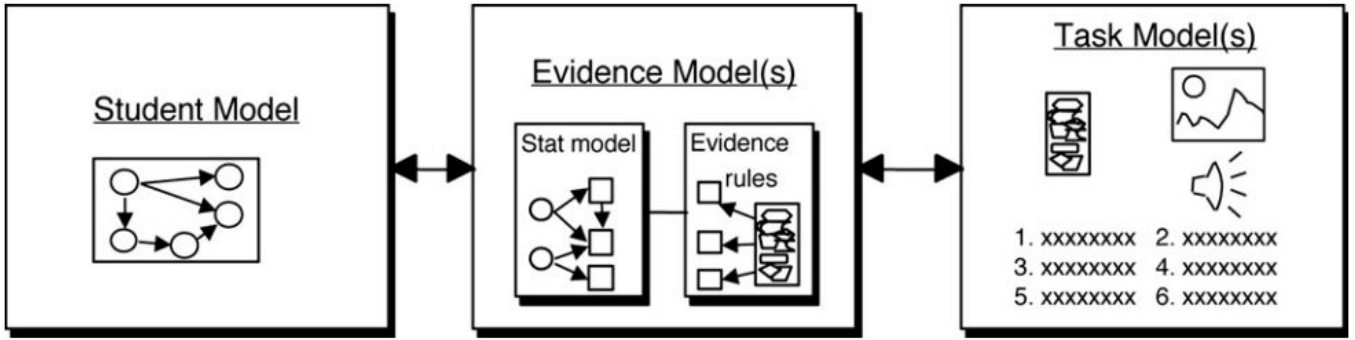
The Learning Design Group

AmplifyScience

Our old development cycle:

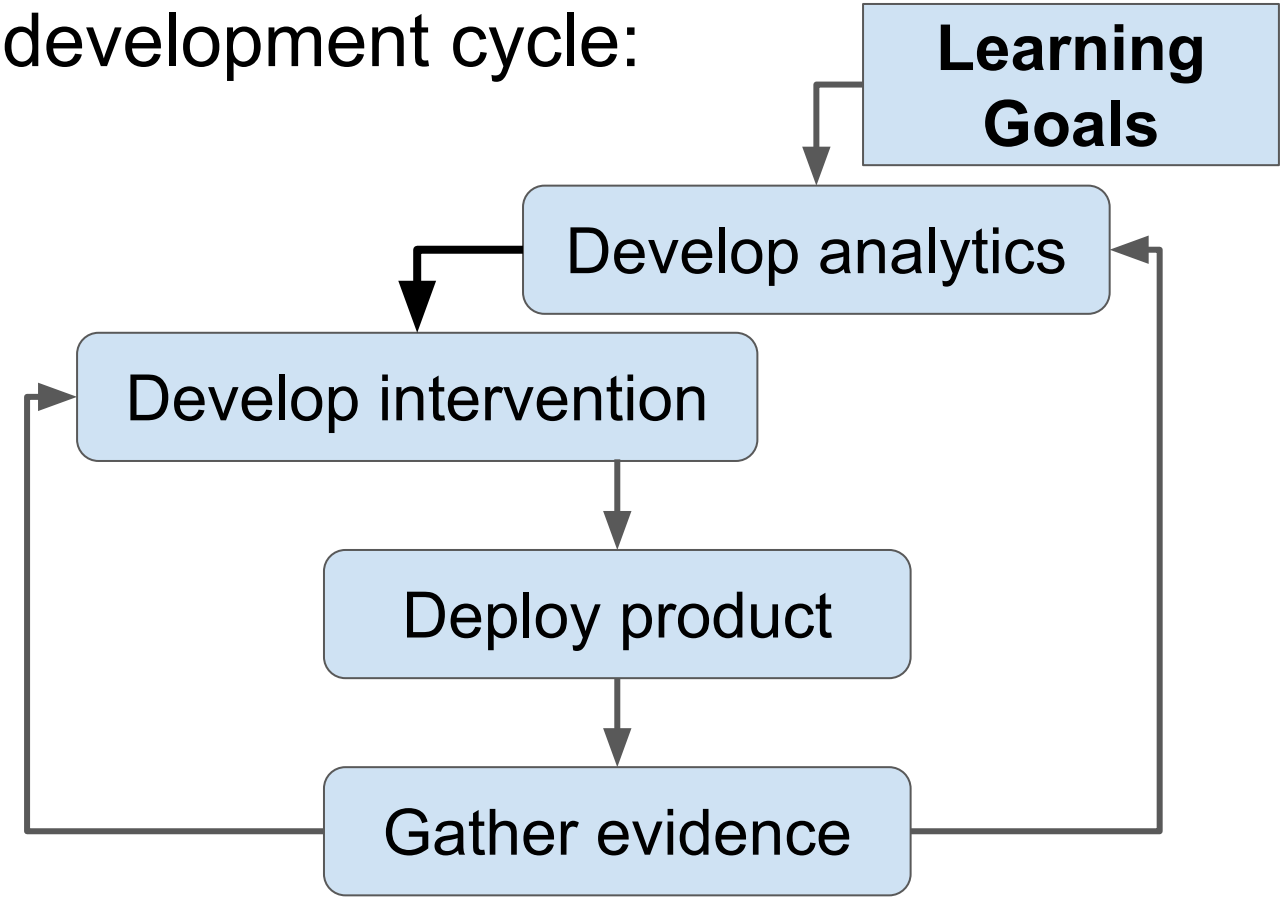


# Evidence Centered Design




Mislevy, Almond, Lukas - 2003

Our new development cycle:



# Keeping instruction focused on learning goals:

1. Develop a “Progress Build” to coordinate the learning goals into a series of progressive (leveled) and integrated understandings.

**Level 3:** Moving a magnet against a stronger magnetic force stores more potential energy

**Level 2:** The energy used to move a magnet against a magnetic force is stored as potential energy

**Level 1:** There’s a repelling force between like poles and an attracting force between opposite poles of a magnet.

# Keeping instruction focused on learning goals:

1. Develop a “Progress Build” to coordinate the learning goals into a series of progressive (leveled) and integrated understandings.
2. Make assessment items that are focused on the different levels of explanation a student would be capable of at different phases in the unit.


Lvl 2: If the magnet is moved closer, what happens to the Potential Energy of the system? What would happen if the magnet is released?

Moving a magnet against a stronger magnetic force stores more potential energy

The energy used to move a magnet against a magnetic force is stored as potential energy

There’s a repelling force between like poles and an attracting force between opposite poles of a magnet.

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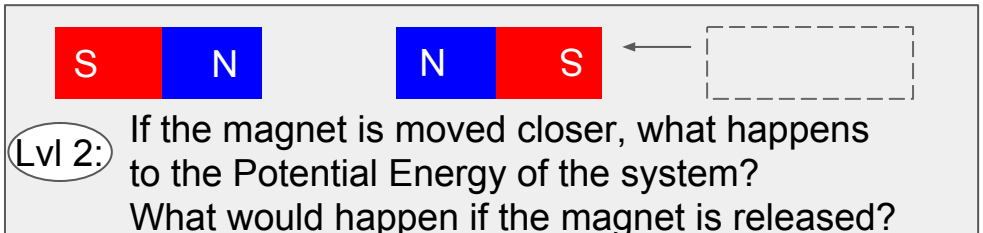
1. Develop a “Progress Build” to coordinate the learning goals into a series of progressive (leveled) and integrated understandings.
2. Make assessment items that are focused on the different levels of explanation a student would be capable of at different phases in the unit.
3. Generate Expected Student Responses to those items, that will serve as **concrete** guides for the team members developing the instruction.

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There’s a repelling force between like poles and an attracting force between opposite poles of a magnet.

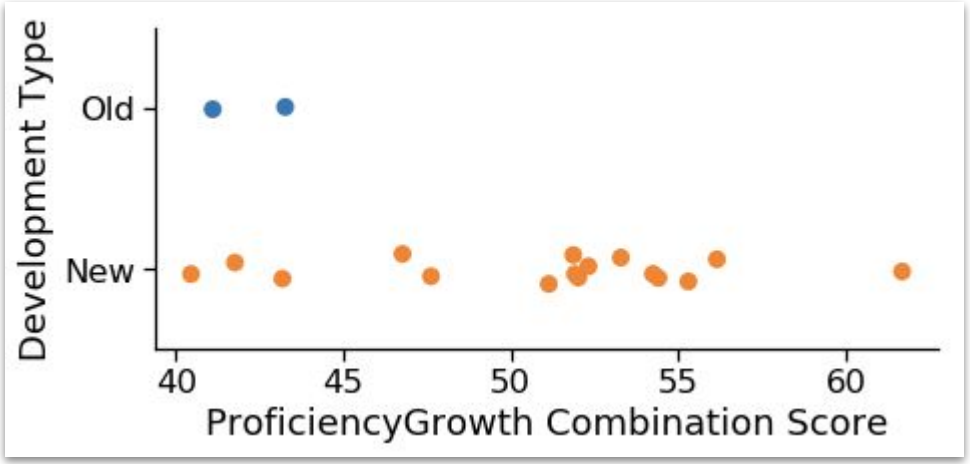
# How much does this matter?

- We had a couple of units that were developed early in our process, which gave rise to the development of these alignment-maintaining tools and which required revisions later down the road. Looking at how these (2) units compared to the other (16) units gives us a **rough** indication of if/how much this affected student learning.
- ProficiencyGrowthCombination =

  (PreScore)*(PostScore) +

  (100-PreScore)*(GrowthScore)

  Significance is *shaky*: p = 0.051
  But effect *could be* large: d = 1.5



# Use the concreteness of analytics evidence to guide the development of your educational interventions

Developing top-down analytics forces you to get very specific about what kinds of behavior 'counts' as understanding. This is obviously important for assessment, but it turns out that this is also very helpful for the design of learning experiences. As it allows developers to easily check for alignment between learning experiences and core learning goals.