Learning From Pioneers

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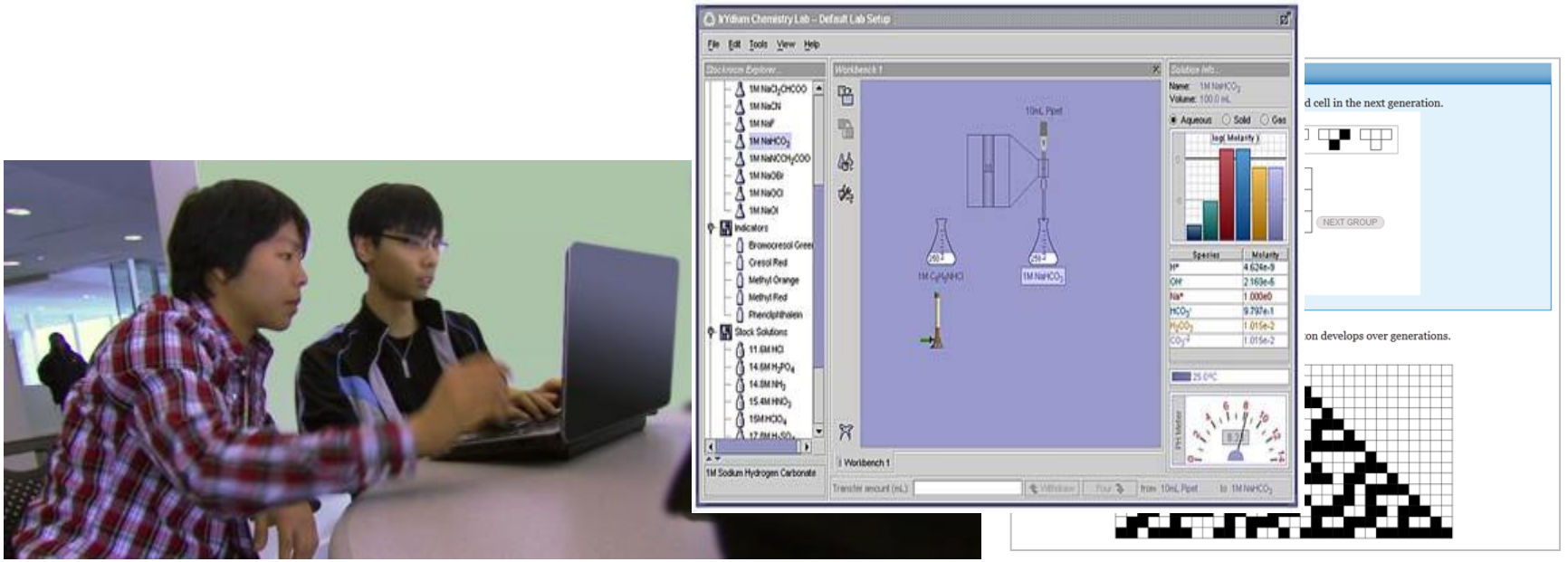
World Academy Forum on The Future of Global HE

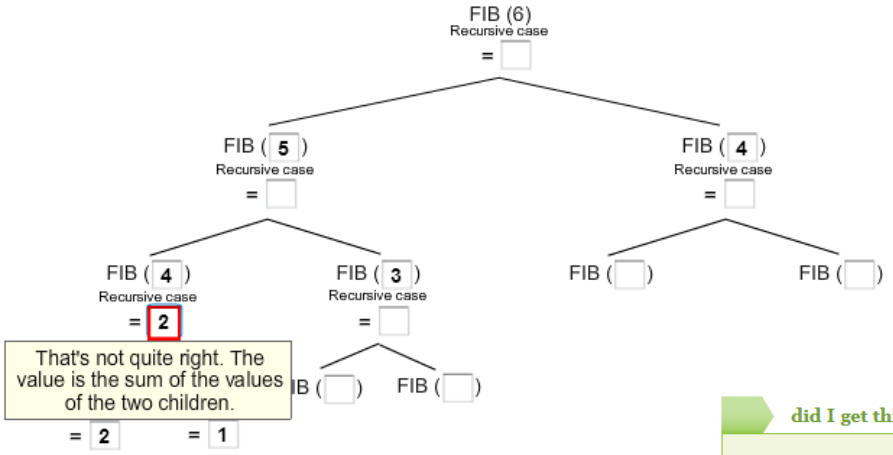
October 2,2013

What is the Open Learning Initiative?

Open online learning environments based on the **science of learning** and designed to improve both quality & productivity in higher education.

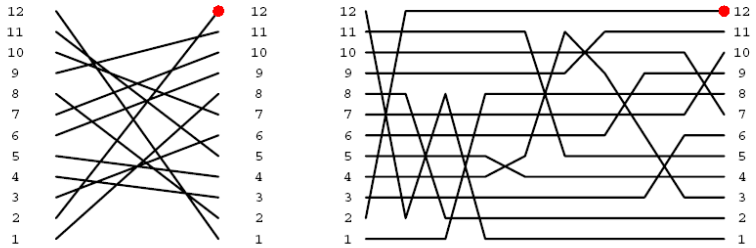


Goal directed practice & targeted feedback enhances the quality of students' learning



So $(1, 2)(2, 3)(3, 4)(4, 5) = (5, 4, 3, 2, 1)$.

Here is a more complicated permutation on $n = 12$, and its decomposition into transpositions.



There are many other identities relating to transpositions. For the next proposition, we abuse notation and use exponents for permutations given in cycle notation.

Proposition

$$(a, b) \circ (b, c) \circ (a, b) = (a, c)$$

$$(1,\ldots,n)^i \circ (1, 2) \circ (n,\ldots,1)^i = (i + 1, i + 2)$$

where $0 \leq i \leq n - 2$

As already mentioned, the decomposition into transpositions is not unique. In fact, not even the number of transpositions used is unique. However, there is still an invariant.

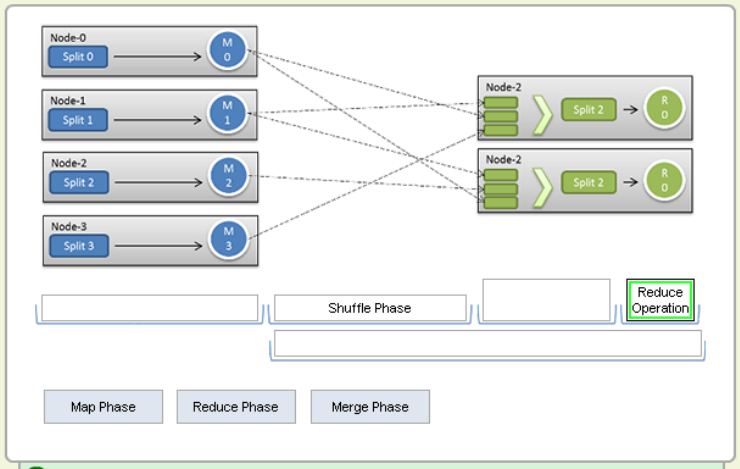
Even permutation

(definition) A permutation is even if it can be written as the product of on **even** number of transpositions, and **odd** if it can be written as the product of on odd number of transpositions.

did I get this

MapReduce Phases

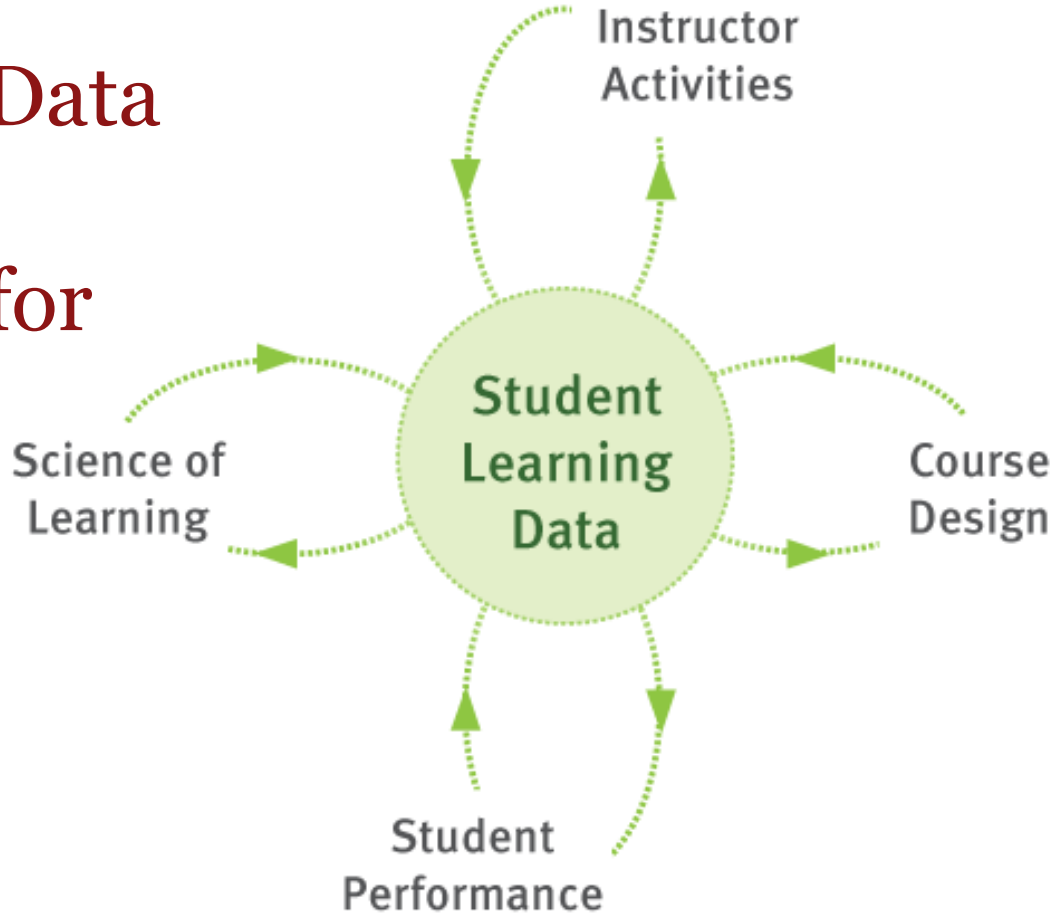
The following image illustrates the various phases of MapReduce. Match the letters (A,B,C,D and E) with their corresponding phase names below:



Correct. The Reduce Operation refers to the reduce function (or reducers) being applied to the merged intermediate outputs.

Learning Dashboard

The "Killer App" Data Collection & Feedback Loops for Continuous Improvement



Module 1

Examining Distributions

ESTIMATED LEARNING LEVEL

Learning Objectives

Summarize and describe the distribution of a categorical variable in context.
[» Show Details...]

Generate and interpret several different graphical displays of the distribution of a quantitative variable (histogram, stemplot, boxplot).
[» Show Details...]

Summarize and describe the distribution of a quantitative variable in context: a) describe the overall pattern, b) describe striking deviations from the pattern.
[» Show Details...]

Relate measures of center and spread to the shape of the distribution, and choose the appropriate measures in different contexts.
[» Show Details...]

Compare and contrast distributions (of quantitative data) from two or more groups, and produce a brief summary, interpreting your findings in context.
[» Show Details...]

Apply the standard deviation rule to the special case of distributions having the "normal" shape.
[» Show Details...]

Class Participation

39 of 40 students participated

48% of 43 activities started on average

» View Participation in Module by Student

Open-ended Responses

» One Categorical Variable > Learn By Doing [11]

» Histogram > Learn By Doing [4]

» My Response: About Stemplots [9]

» Measures of Center > Learn By Doing [12]

Show All (14 more)

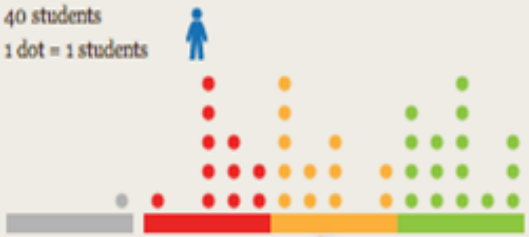
Checkpoints and Quizzes

» Checkpoint: Examining Distributions Checkpoint 1 [38]

» Checkpoint: Examining Distributions Checkpoint 2 [36]

Relate measures of center and spread to the shape of the distribution, and choose the appropriate measures in different contexts.
[» Hide Details...]

Estimated Learning *by Student*



Class Accuracy by *Sub-Objective*

Students with Moderate Estimated Learning

	ACTIVITIES ATTEMPTED
Student names removed	7
	8
	10
	8
	9
	8
	9
	8
	10
	8
	9
	9

Contact these students

ve data) from two or more groups, and
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Class Parti

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[4]

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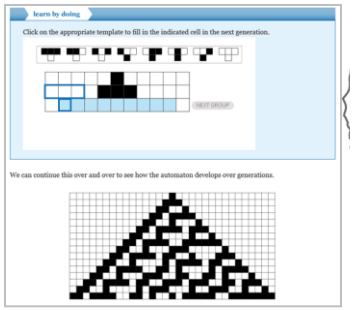
LearnLab:
Transforming Education Research

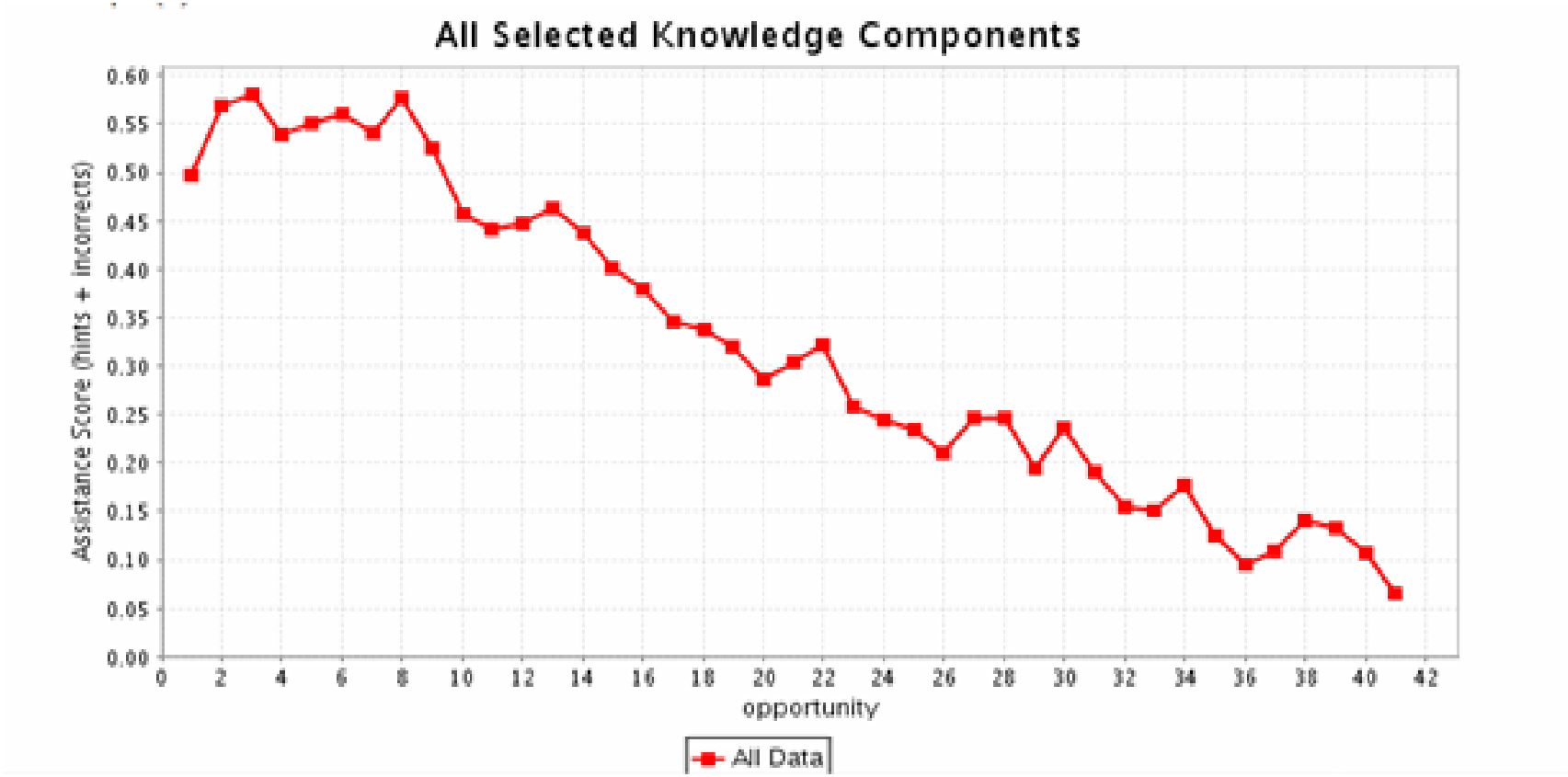


LearnLab
Pittsburgh Science of Learning Center

Ed tech + wide use = "Basic research *at scale*"

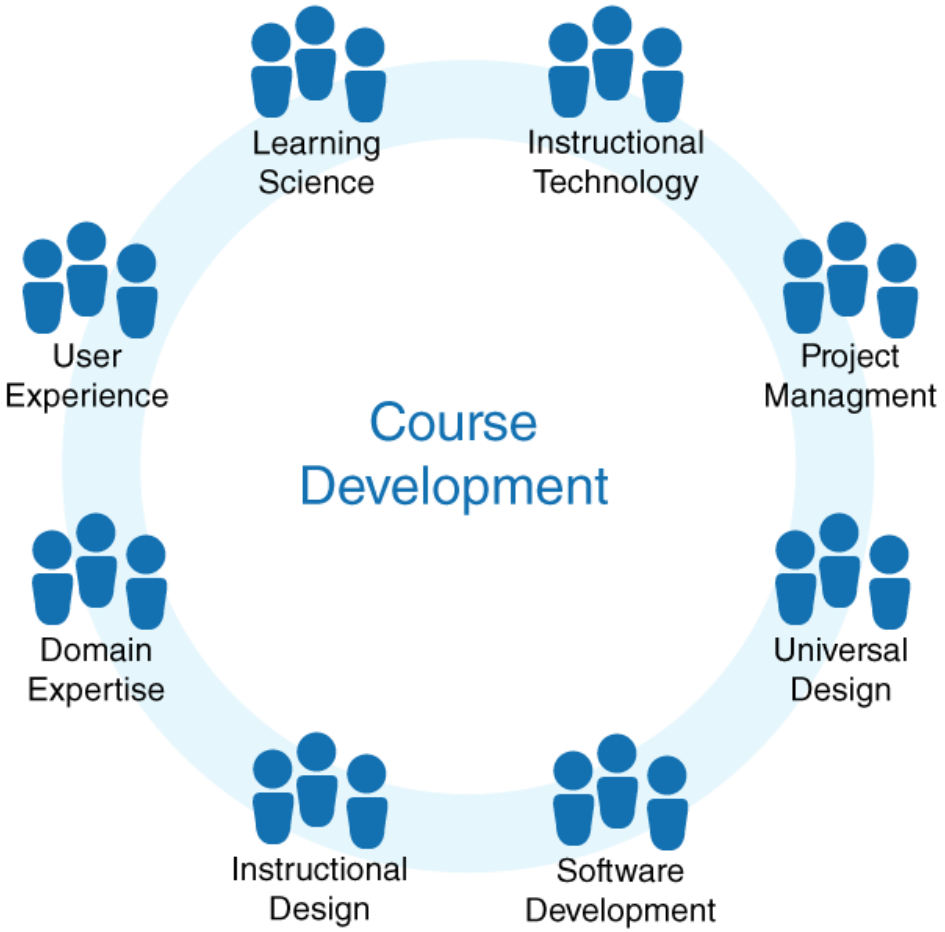
- NSF Science of Learning Center
- 10 years, ~$50 million
- Tech enhanced courses, assessment, & research
- School cooperation for data collection

Learning Curve Analysis



DataShop: Pittsburgh Science of Learning Center

Team-based design and development

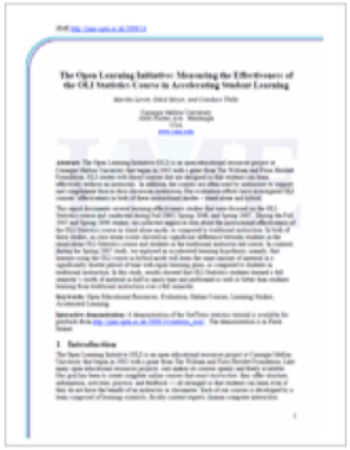


Review:

- Apply learning science research and scientific method to course development, implementation and evaluation.
- Develop interactive learning environments collaboratively
- Feedback loops for continuous improvement.
- Communities of use, evaluation and improvement.

What Difference Does it Make?

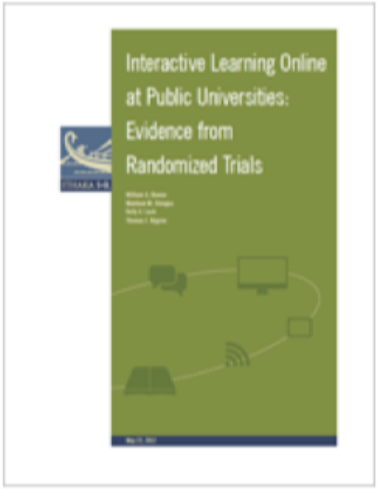
Results



OLI STUDY ON ACCELERATING STUDENT LEARNING WITH OLI STATISTICS

Lovett, M., Meyer, O., & Thille, C. (2008). The Open Learning Initiative: Measuring the effectiveness of the OLI statistics course in accelerating student learning. Journal of Interactive Media in Education.

This study, conducted at Carnegie Mellon University, shows that students using the OLI statistics course at Carnegie Mellon achieved the same or better learning outcomes as students in the traditional course in **half the time**.



INDEPENDANT TRIAL OF THE OLI STATISTICS COURSE

Bowen, W.G., Chingos, M.M., Lack, K.L., & Nygren, T.I. (2012). Interactive Learning Online at Public Universities: Evidence from Randomized Trials. ITHAKA.

The results of this study are remarkable; they show comparable learning outcomes for this basic course, with a promise of cost savings and productivity gains over time.
Deanna Marcum
Managing Director, Ithaka S+R

OLI Development and Use (2006)

Use

- 117,963 Course Enrollments (Academic)
- Used by 1,809 Instructors in 1,050 Institutions
- 1,148,807 Independent Learners (Registered and Anonymous)

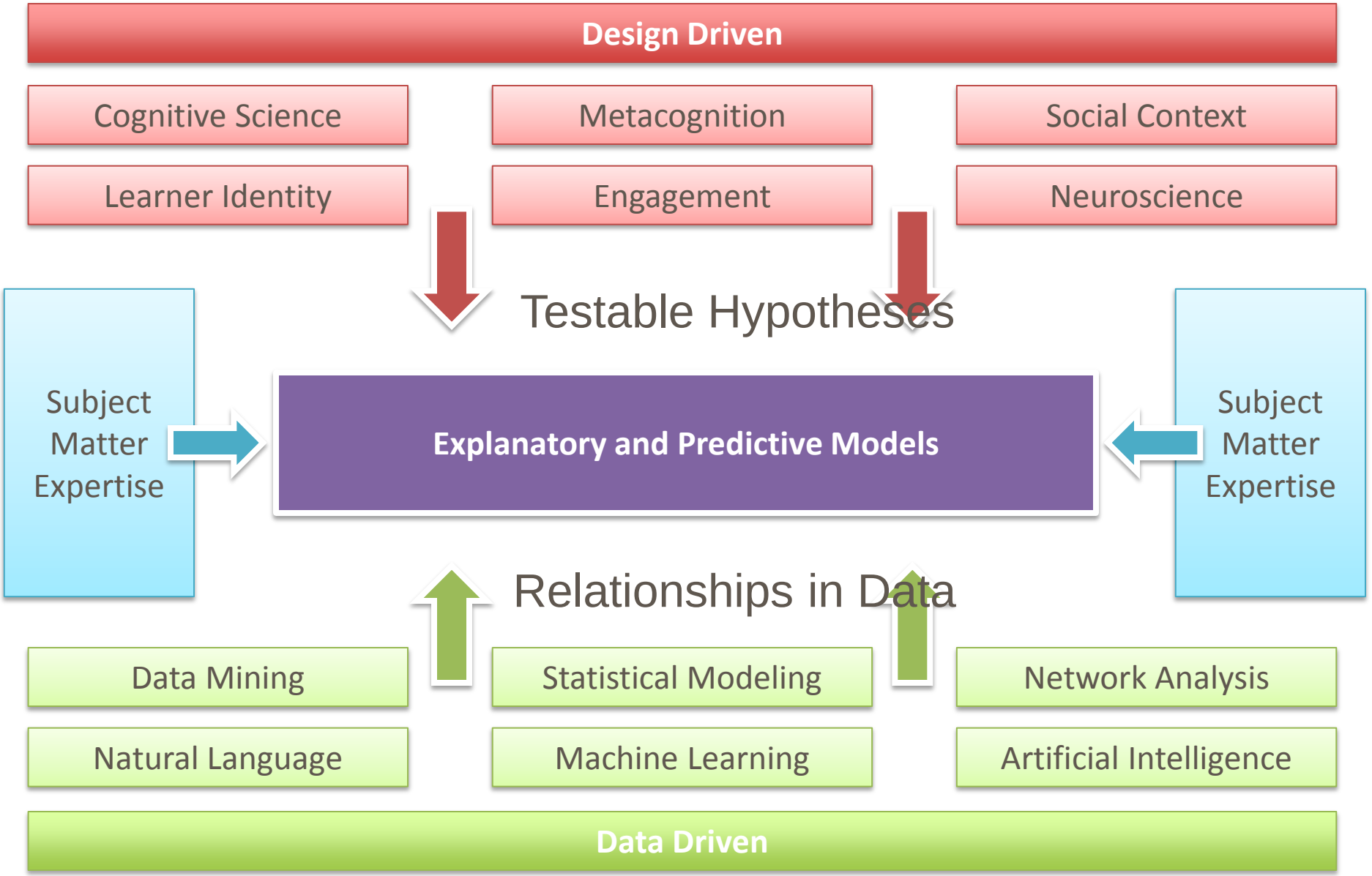
Development

- 44 Academic courses have been created
- By 104 contributing Faculty from 55 Institutions

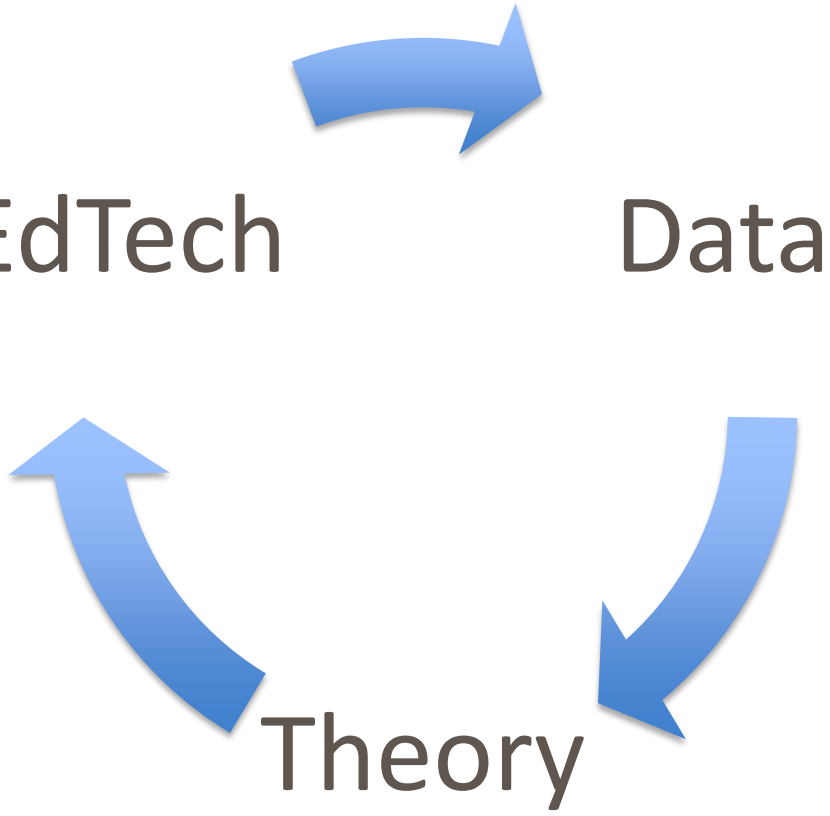
OLI Projects

- Open Professionals Education Network (OPEN) free services for TAACCCT grantees
- Community College Open Learning Initiative (CC-OLI)
- Next Generation Learning Challenge Projects
- Evaluation Pilots: WGU, Texas & Washington
- Carnegie Foundation Statway
- Introduction to Computer Science
- UMUC Development/Adaptation project
- OLNet – Open Education Research Network
- Hewlett Packard Catalyst: Measuring Learning

Build OLI Functionality into


Design Driven
Cognitive Science
Metacognition
Social Context
Learner Identity
Engagement
Neuroscience
Testable Hypotheses
Subject Matter Expertise
Explanatory and Predictive Models
Subject Matter Expertise
Relationships in Data
Data Mining
Statistical Modeling
Network Analysis
Natural Language
Machine Learning
Artificial Intelligence
Data Driven

Strategy for Educational Improvement



Open Data and Data Formats

Share Alike and Share Data

(This doesn't exist, but we think it should.)

Build and promote communities of research.

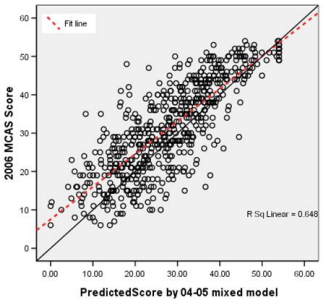
Pasteur's Quadrant

Stokes argues basic/applied goals need not trade off

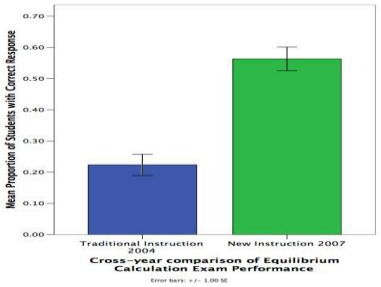
	Low Emphasis on Applied Work	High Emphasis on Applied Work
High Emphasis on Basic Science	How to translate to real world? (**Bohr**)	 (**Pasteur**)
Low Emphasis on Basic Science	X	What principle can be derived? (**Edison**)

Better Science & Technology …

Improves Assessment



Increases Outcomes



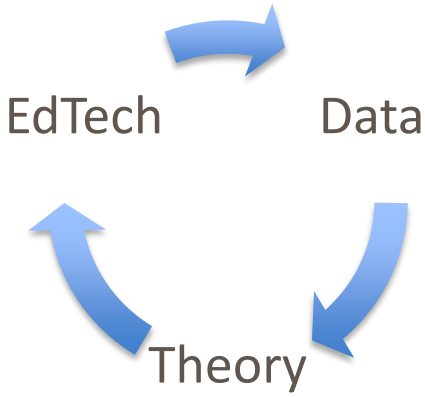
Accelerates Learning

> 100 hours
~3% gain

→

< 50 hours
~18% gain

Produces A Virtuous Cycle



"Without a complete revolution…in our approach to teaching…we cannot go beyond (current levels) of productivity" (Baumol, 1967).

Our message:
Such a revolution is possible.

Our question:
Who will lead it?

OLI Funders

THE WILLIAM AND FLORA HEWLETT FOUNDATION

BILL & MELINDA GATES foundation

Lumina FOUNDATION

spencer

THE KRESGE FOUNDATION

The Walter S. Johnson Foundation

- LearnLab is funded by The National Science Foundation award number SBE-0836012.