



UNIVERSITY OF
TEXAS
ARLINGTON



EDM, LA, and Visualization

George Siemens, PhD

IEEE

November 10, 2017

SOLAR
SOCIETY for LEARNING
ANALYTICS RESEARCH



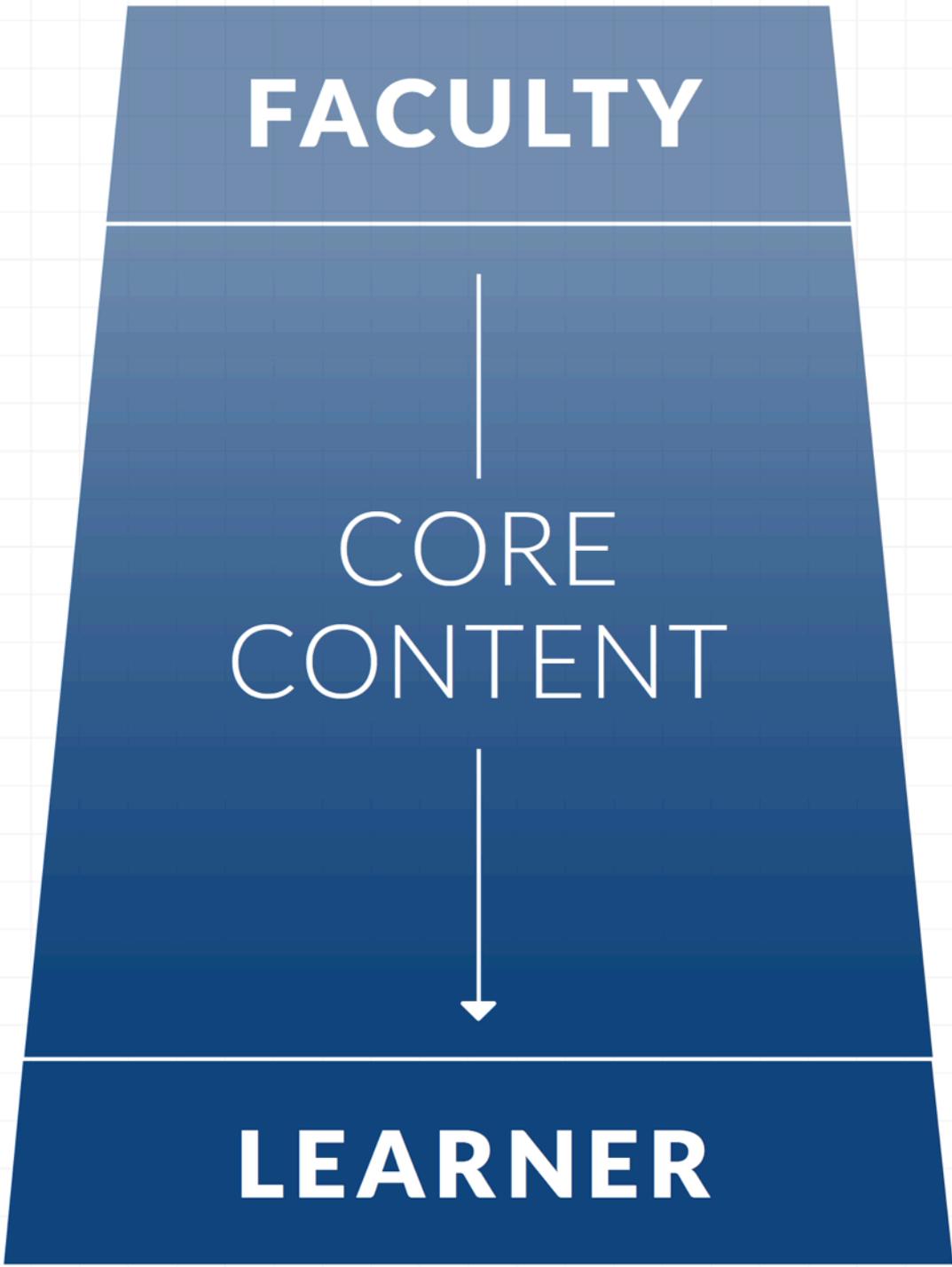
Complexification of higher education

Learning needs are complex, ongoing

Simple singular narrative won't suffice going forward

The **idea of the university (and learning)** is expanding and diversifying

FACULTY



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graph TD; Faculty[FACULTY] --- CoreContent[CORE CONTENT]; CoreContent --> Learner[LEARNER];
```

CORE
CONTENT

LEARNER

**PERIPHERAL
LEARNERS**

**EXTERNAL
EXPERTS**

FACULTY

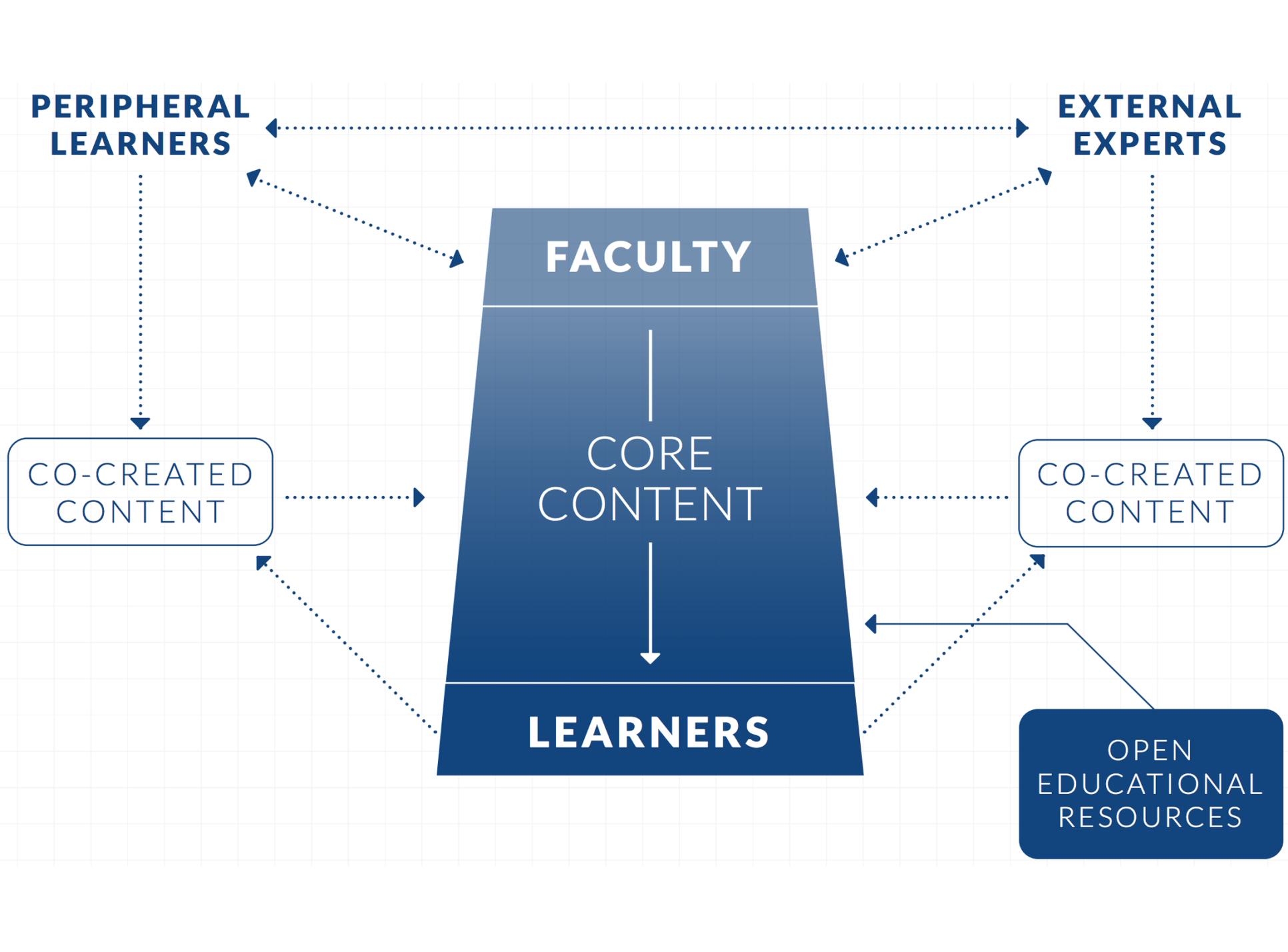
CORE
CONTENT

LEARNERS

CO-CREATED
CONTENT

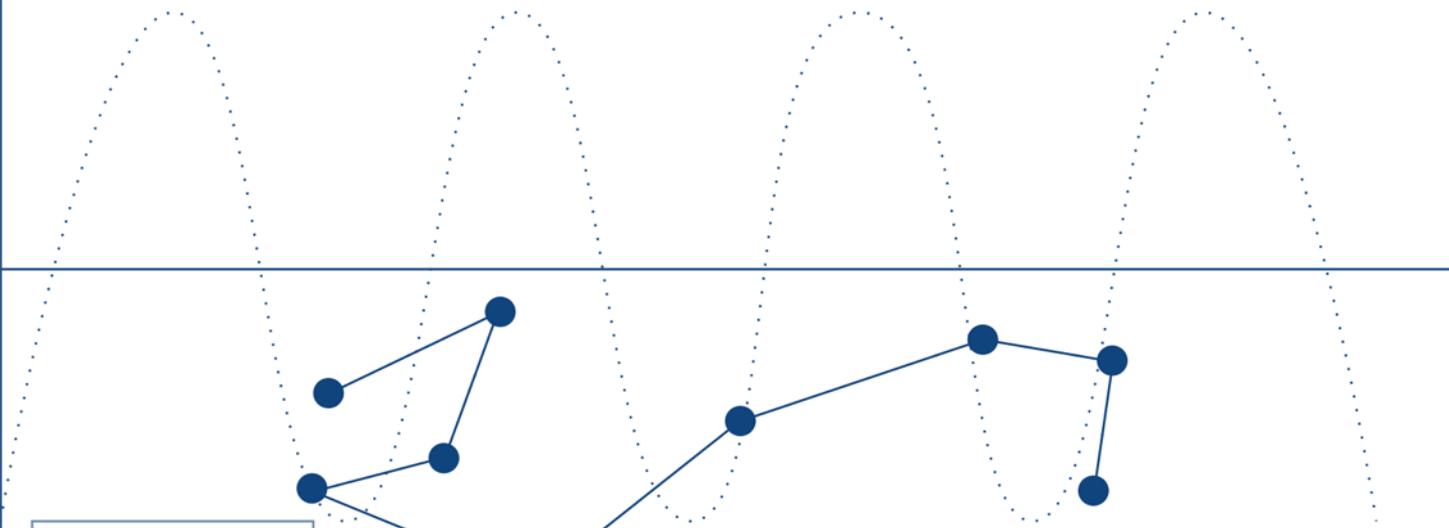
CO-CREATED
CONTENT

OPEN
EDUCATIONAL
RESOURCES

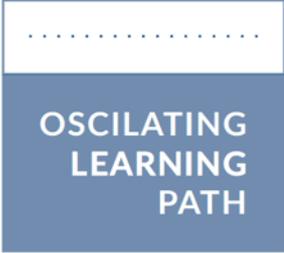




Traditional Sequential Course



Connective Knowledge



Human and machine intelligence

How do these interact in the future of higher education?

Important to know what works where

Ineffective to

- Scale through humans what should be scaled through technology
 - Inferring and detecting knowledge and other key aspects of learner
- Trying to scale through technology what should be scaled by humans
 - Intervening on deep misconceptions or in the face of disengagement

Knowledge development, learning, is (should be) concerned with **learners understanding relationships**, not simply memorizing facts.

i.e. naming nodes is “low level” knowledge activity, understanding node connectivity, and implications of changes in network structure, consists of deeper, coherent, learning

Research broadly, analytics &
visualization specifically, is a
structured process of relationship
discovery

“More is different”

Anderson (1972)

Overload is not new

“Confusing and harmful abundance of books”

Conrad Gesner (1550)

Blair, Journal of History of Ideas (Jan, 2003)

Visualization is a brokering entity
between quantity and human
sensemaking

Enter learning analytics

“Learning analytics is the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs”

LAK11

“... escalating the speed of research on many problems in education.”

“Not only can you look at unique learning trajectories of individuals, but the sophistication of the models of learning goes up enormously.”

*Arthur Graesser, Editor,
Journal of Educational Psychology*

Examples

PREDICTION DISTRIBUTION - FALL 2014 - FALL 2015

VERY LOW >20%
28 STUDENTS

1%

LOW 20 - 50%
309 STUDENTS

7%

MODERATE 50 - 70%
499 STUDENTS

15%

HIGH 70 - 90%
1,431 STUDENTS

31%

VERY HIGH <90%
2,083 STUDENTS

46%



Figure 1. Degree Compass

The screenshot displays the OneStop Austin Peay State University website. On the left, a sidebar window titled "BIOL 1010: Principles of Life" provides course details. The main content area features a "Courses To Consider" section with a list of suggested courses, each with a star rating and a "View Sections" button. A "My Courses" section on the right provides access to APOnline and RDDP courses. The top navigation bar includes links for "Learn", "Work", "Advancement", and "Finance".

BIOL 1010: Principles of Life

Course Description: A course for non-science majors. Topics covered include scientific methodology, the nature of living organisms, cell structure and function, cell chemistry and division, nature of heredity and gene action, the theory of evolution and principles of ecology. BIOL 1010 will not serve as a prerequisite of upper level biology courses.

Note: To add any of the sections below to your class schedule, return to the main OneStop window, click on the "Web Self Service" tab, then "Student", then "Registration", then "Add or Drop Classes". You'll also want to make note of the CRN for the course you wish to register for as this will make finding the class in the registration system easier.

Spring Semester 2011

Class Section: 01

Class CRN: 1135
Instructor: Finley, Mack
Credit Hours: 3
Time: 08:00 am - 08:55 am
Days: MWT
Campus: Austin Peay SU, Main Campus
Location: Sundquist Science Complex E106A
Instructional Method: Conventional Methodology
Start Date: 13-JAN-11
End Date: 06-MAY-11
Capacity: 99
Seats Open: 98
Seats Filled: 1

Courses You Should Consider:

Course	Rating	Action
BIOL1011 - Principles of Life Lab	★★★★☆	View Sections
BIOL1010 - Principles of Life	★★★★☆	View Sections
GEOL1041 - Physical Geology Lab	★★★★☆	View Sections
BIOL2011 - Human Anat and Phys Lab	★★★★☆	View Sections
GEOL1040 - Physical Geology	★★★★☆	View Sections

[See more suggestions...](#)

Filter:

These suggestions are courses in which other students similar to you have made successful progress in your program of study. You should always consult your advisor when planning your schedule.

My Courses

AP Austin Peay Online
Wherever you go, there we are.

APOnline

Use this link to access your W1, W2, etc. APOnline course sections.

Note: If you are planning to browse your course for longer than 30 minutes (or to take a quiz or post a forum topic), please use the direct login, <http://olearn.apou.edu> to avoid Onestop timing out your online course session.

RDDP

Click here to access your R50, R51, etc. courses. (Requires log-in)

RDDP Login Instructions
Login instructions are located on the RDDP Online login page.

Your location: Discussions > Assessment Discussion

Assessment Discussion

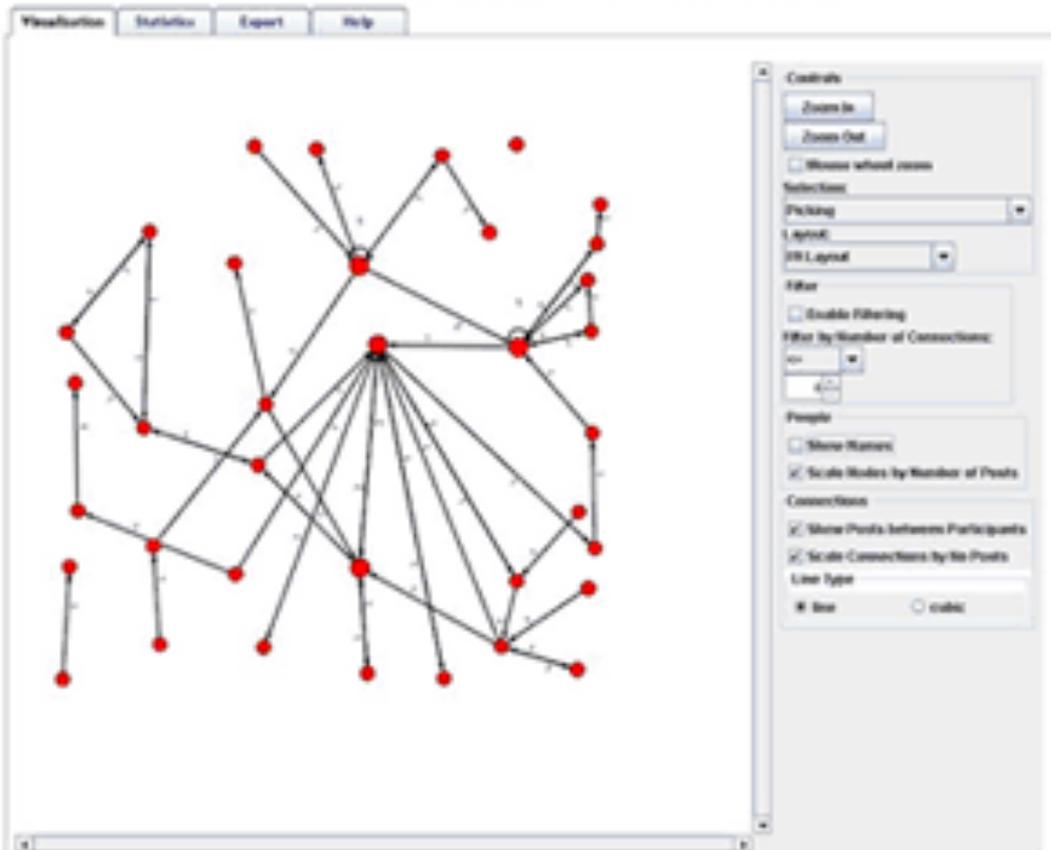
Description (click to expand)

Create Message

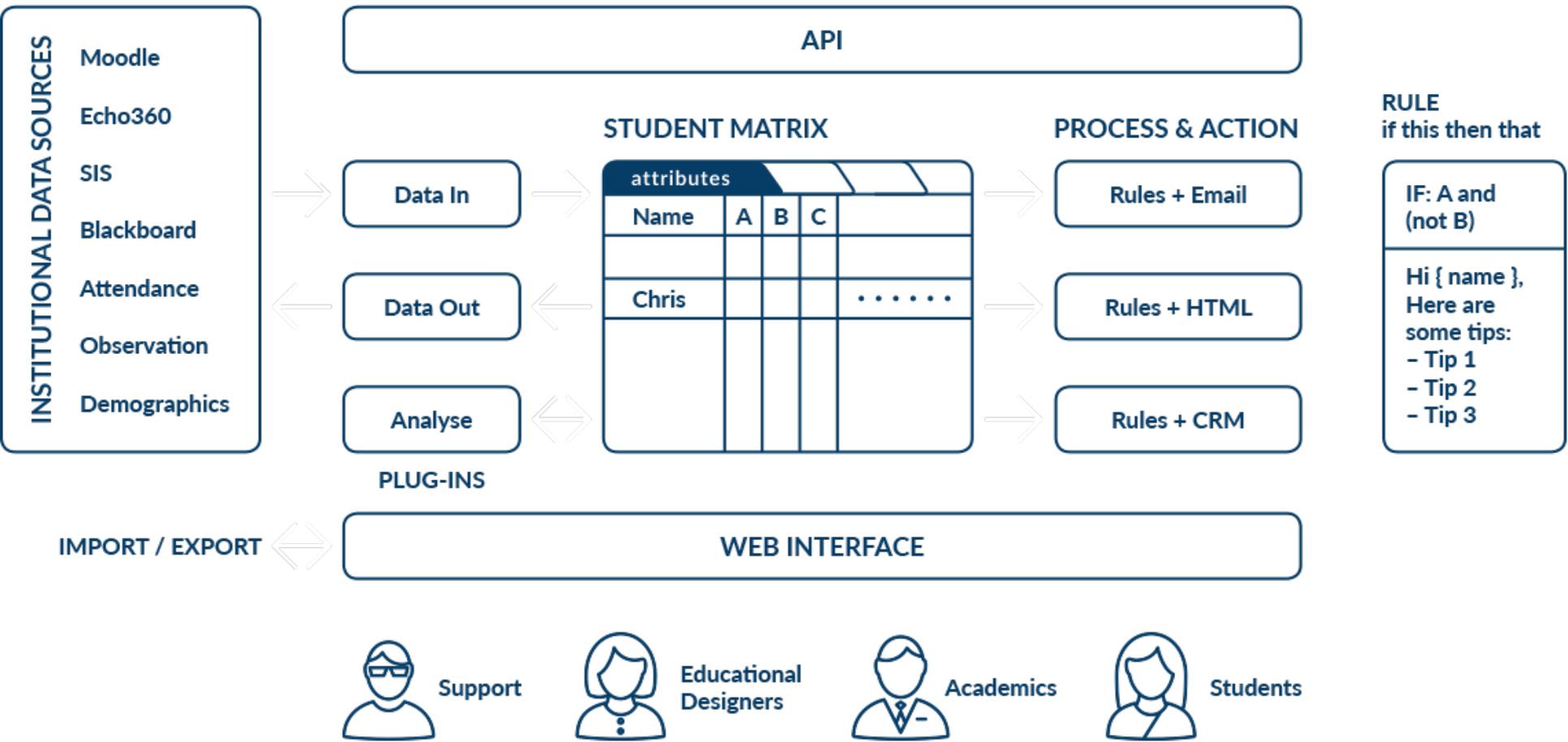
Expand All Collapse All

- Subject
- Exam Schedule %
- anatomy formative answers %
- Re:anatomy formative answers %
- GL block quiz %
- GL quiz 7 question %
- BCA POEM - Formative %
- Re:BCA POEM - Formative %
- Quiz question %
- Assessment Committee Meeting 10/08/09 %
- Re:Assessment Committee Meeting 10/08/09 %
- formative quiz stats %
- Re:formative quiz stats %
- Re:formative quiz stats %
- formative quiz %
- Re:formative quiz %
- Re:formative quiz %
- Re:formative quiz %

Social Networks Adapting Pedagogical Practice (SNAPP)



<http://research.uow.edu.au/learningnetworks/seeing/snapp/index.html>



Subway maps: IOLC

COCOA Grant

How does the architecture of a technology space influence learner agency and autonomy?

Wikipedia, Stack Exchange, MOOCs

Pathways, learner profiles

NSF #1546393

Problem is quality of educational research

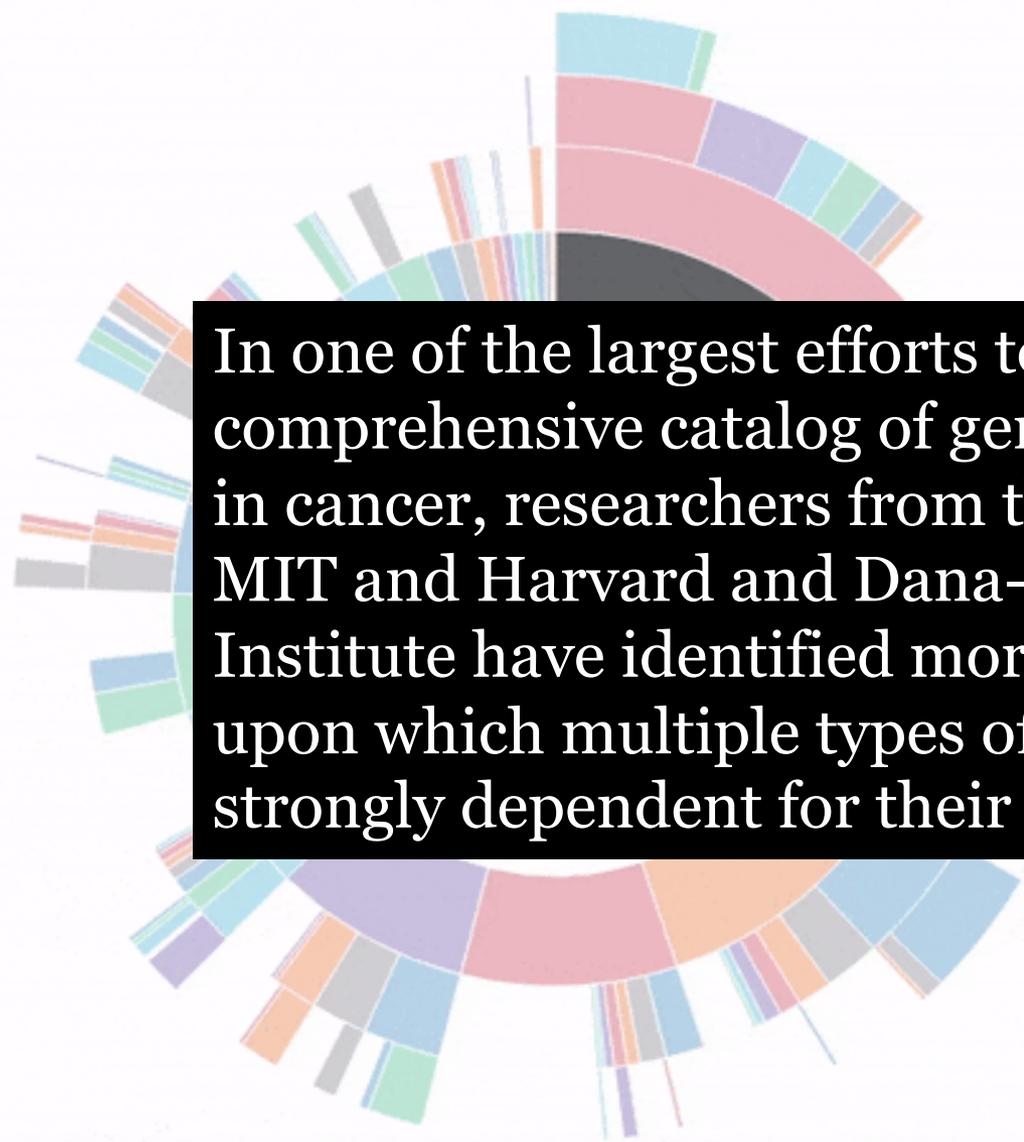
Learning/educational research is a horizontal concern in the academy

ER is contested space – ideology, activism

Traditional research simply doesn't work (in terms of quality, generalization, impact). But emerging models are not scientific.

Research challenge

1. Defining and architecting a knowledge space
2. Detailing human learning...but in a contextual, dependency model



In one of the largest efforts to build a comprehensive catalog of genetic vulnerabilities in cancer, researchers from the Broad Institute of MIT and Harvard and Dana-Farber Cancer Institute have identified more than 760 genes upon which multiple types of cancer cells are strongly dependent for their growth and survival.

Personal Knowledge Graph

People – learners, students, everyone – should have a personal knowledge graph (PKG)

A network model of what we know

Learner-owned

