UNIVERSITY OF TEXAS ARLINGTON

LINK

EDM, LA, and Visualization

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IEEE

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SOLAR

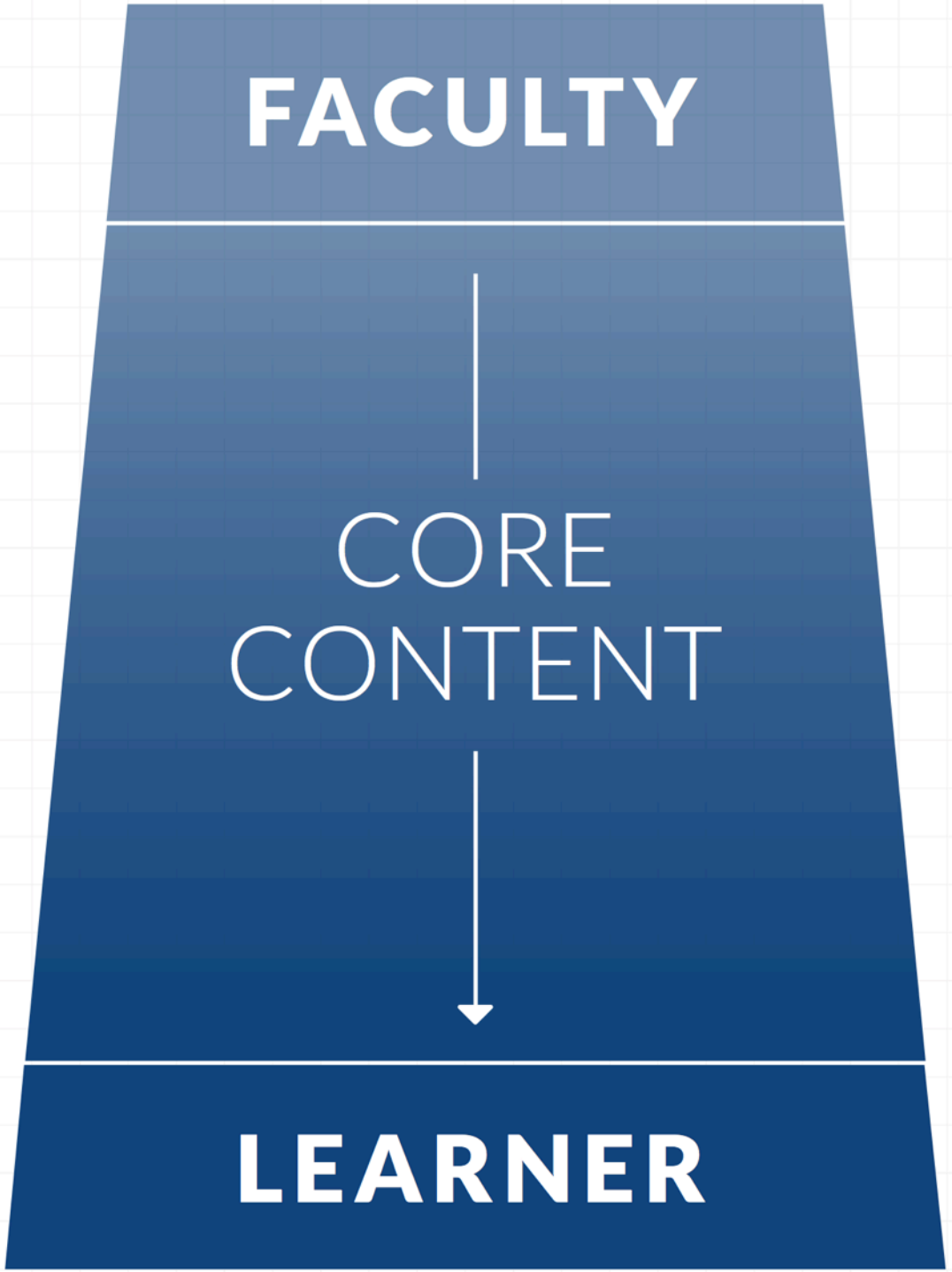
SOCIETY for LEARNING ANALYTICS RESEARCH

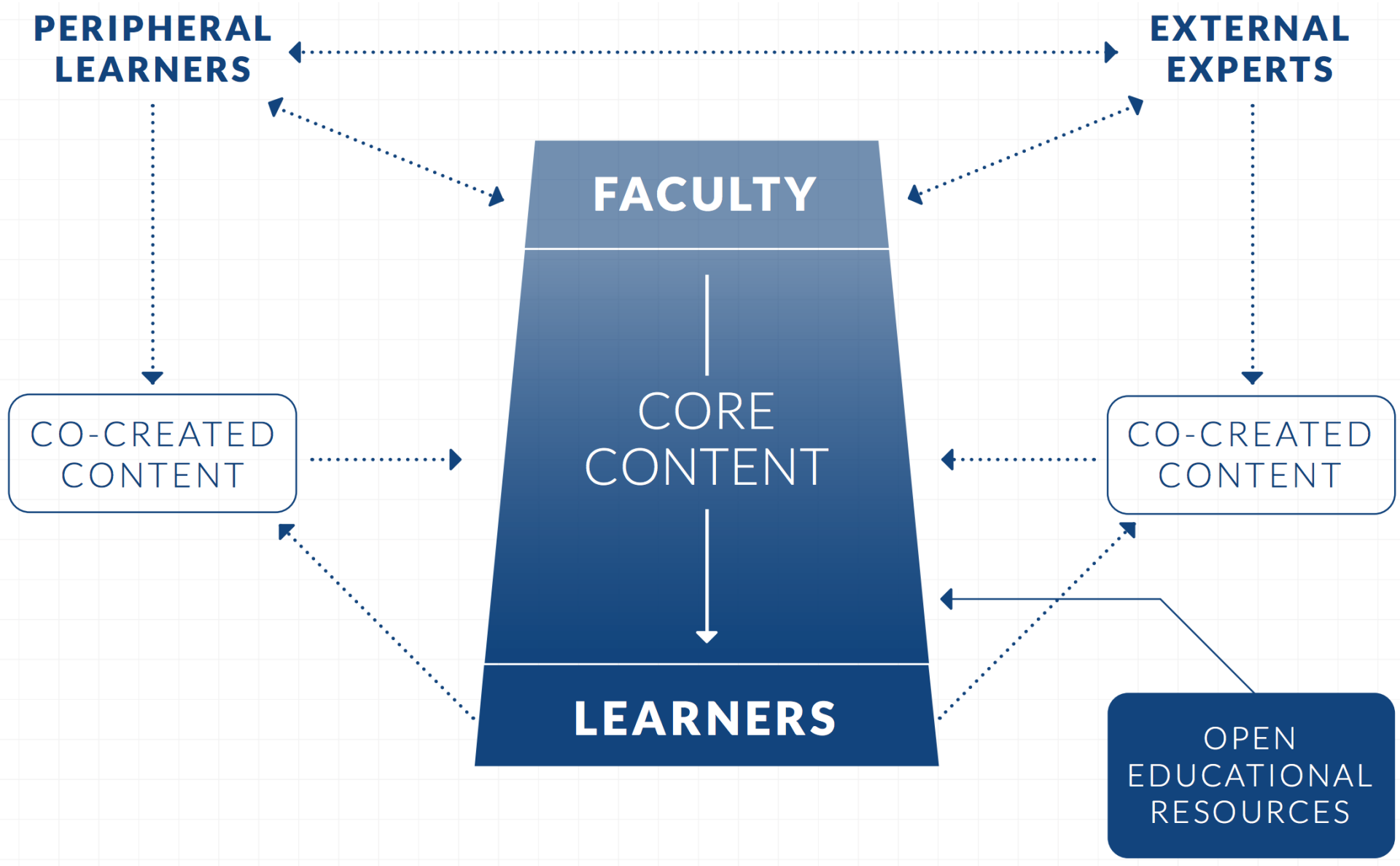
Complexification of higher education

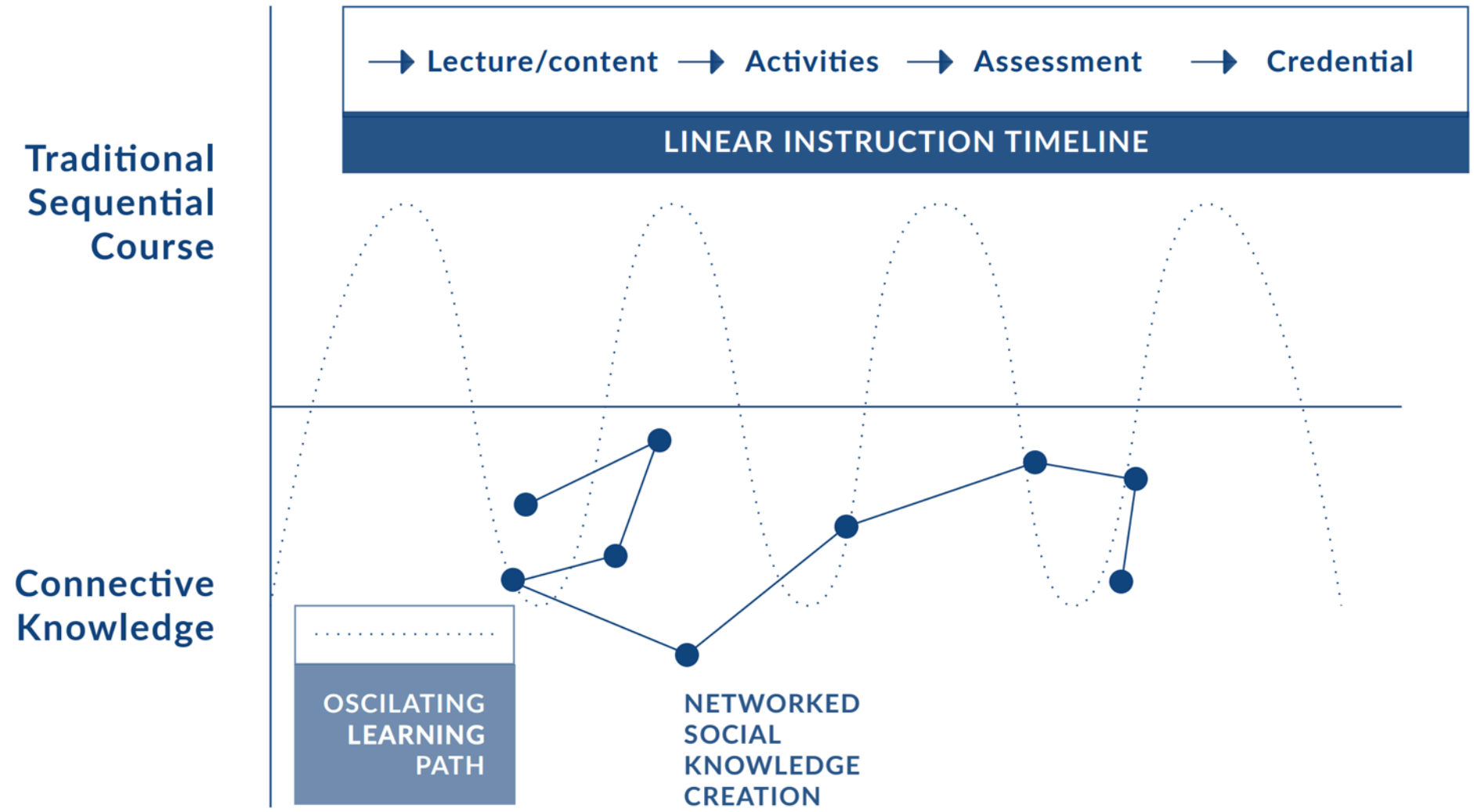
Learning needs are complex, ongoing

Simple singular narrative won't suffice going forward

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


FACULTY
CORE
CONTENT
LEARNER


PERIPHERAL LEARNERS
EXTERNAL EXPERTS
FACULTY
CORE CONTENT
LEARNERS
CO-CREATED CONTENT
CO-CREATED CONTENT
OPEN EDUCATIONAL RESOURCES


Traditional Sequential Course
Lecture/content
Activities
Assessment
Credential
LINEAR INSTRUCTION TIMELINE
Connective Knowledge
OSCILATING LEARNING PATH
NETWORKED SOCIAL KNOWLEDGE CREATION

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

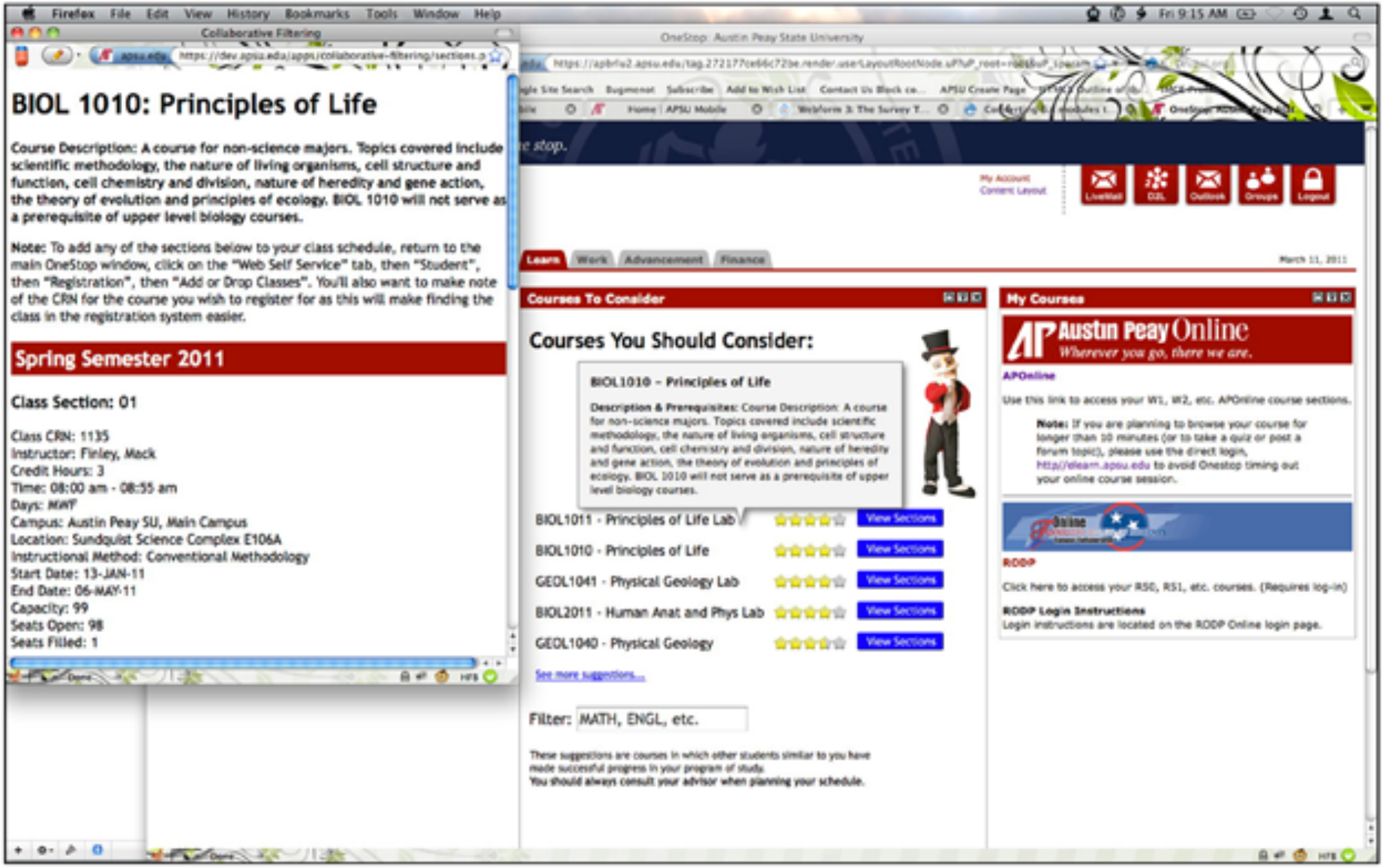
Examples

CIVITAS LEARNING

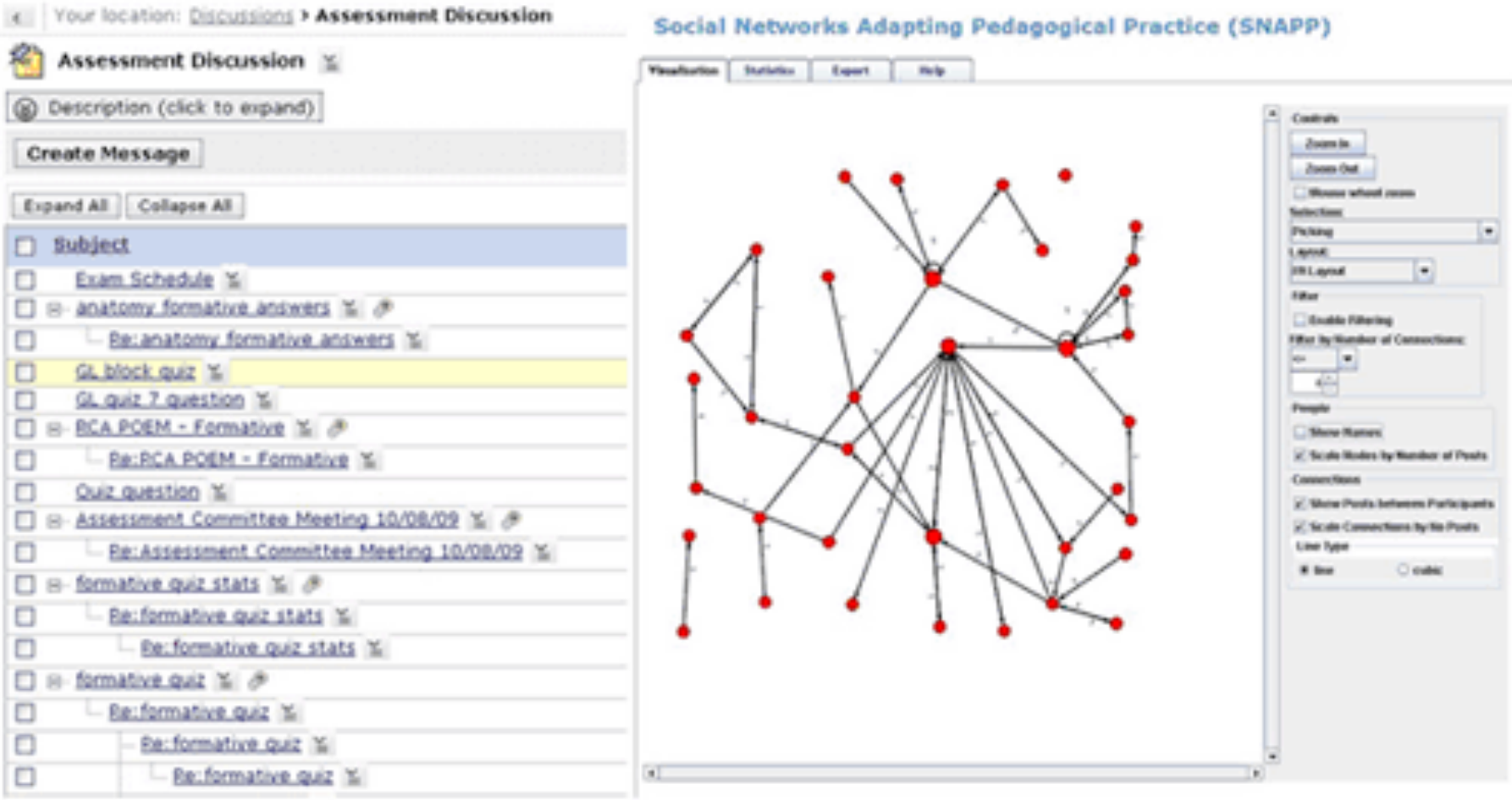
PREDICTION DISTRIBUTION - FALL 2014 - FALL 2015

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%

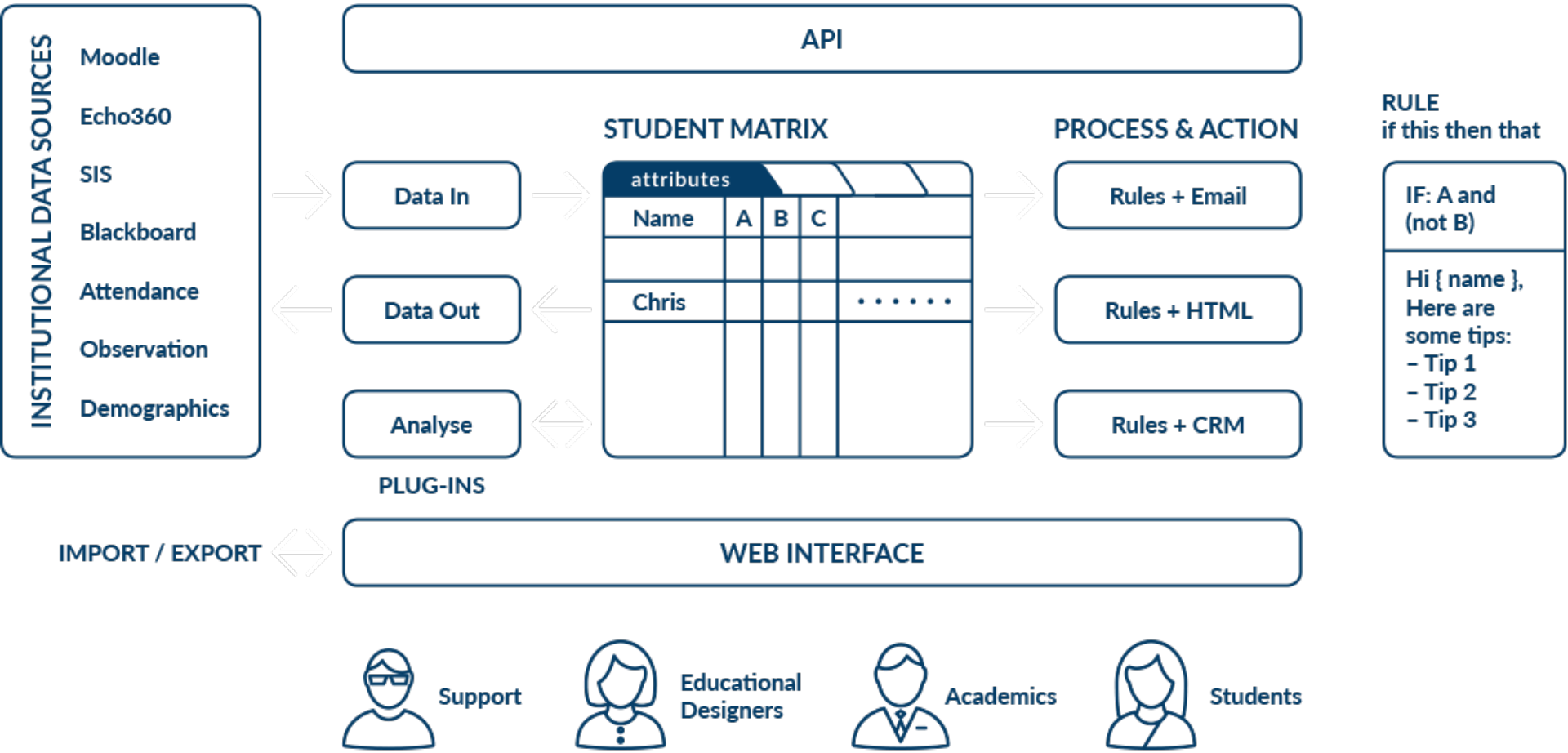
Figure 1. **Degree Compass**



Denley, 2012



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


INSTITUTIONAL DATA SOURCES
Moodle
Echo360
SIS
Blackboard
Attendance
Observation
Demographics
API
STUDENT MATRIX
PROCESS & ACTION
RULE
if this then that
Data In
Data Out
Analyse
attributes
Name
A
B
C
Chris
Rules + Email
Rules + HTML
Rules + CRM
IF: A and (not B)
Hi { name },
Here are some tips:
– Tip 1
– Tip 2
– Tip 3
PLUG-INS
IMPORT / EXPORT
WEB INTERFACE
Support
Educational Designers
Academics
Students

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

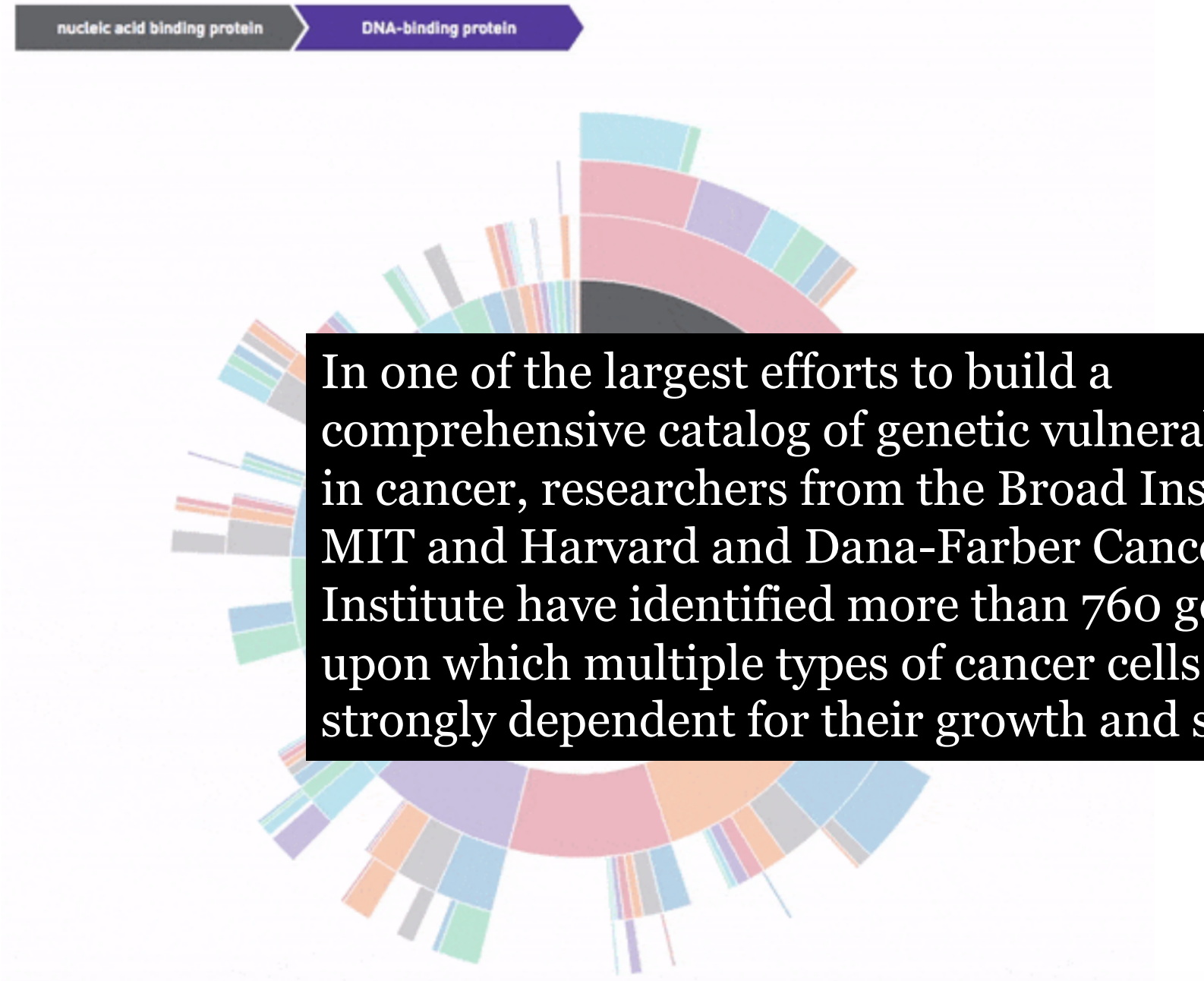
Learning/educational research is a horizontal concern in the academy

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

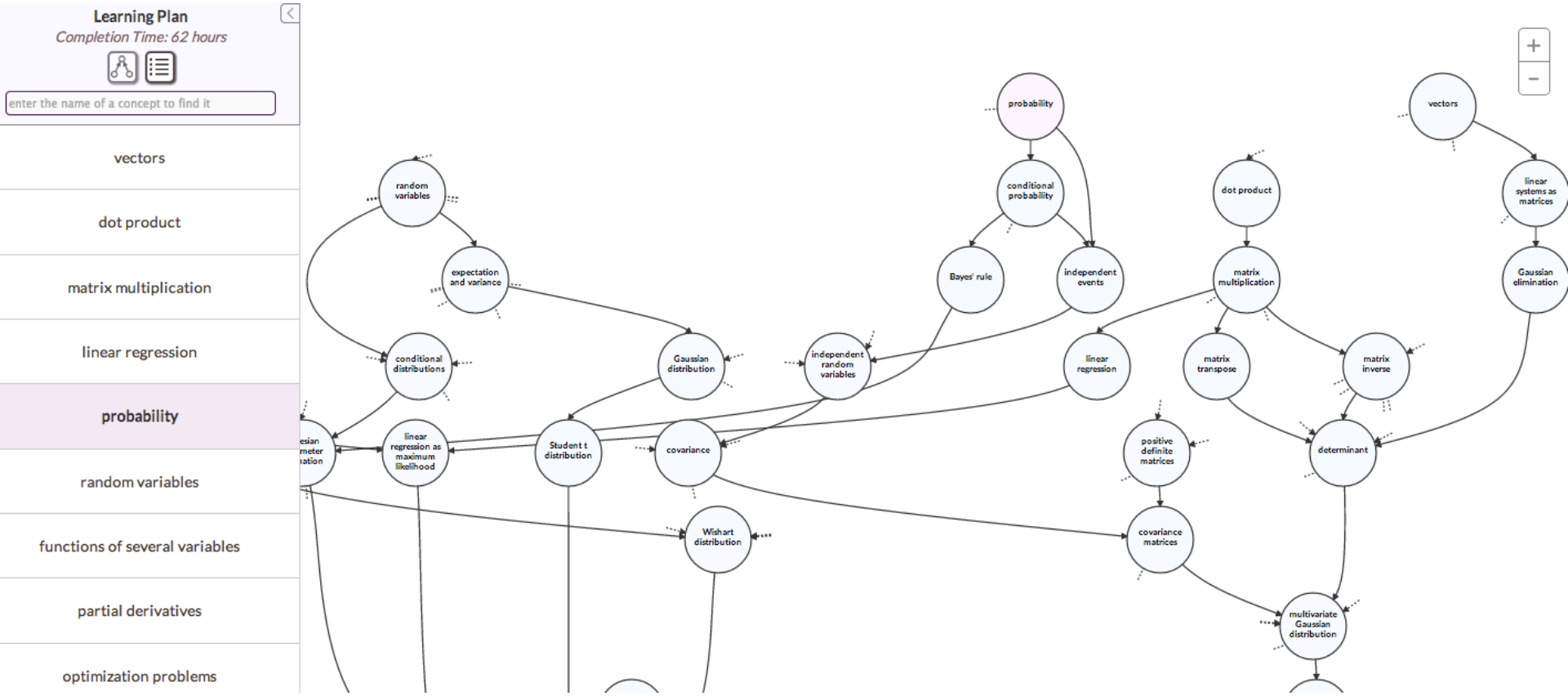
1. Defining and architecting a knowledge space
2. Detailing human learning…but in a contextual, dependency model



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.

Graphic: The Broad Institute of MIT and Harvard

Concept architecture



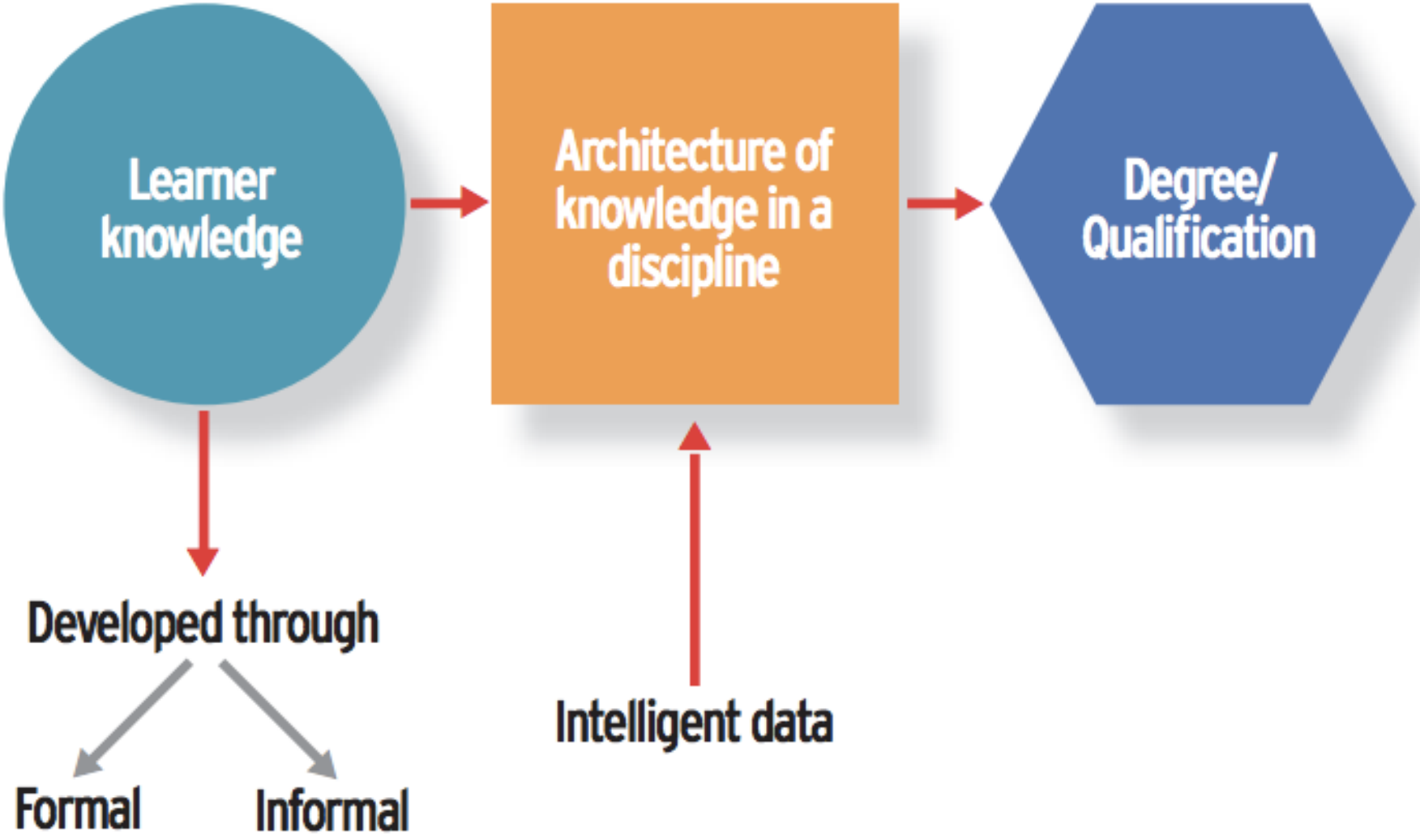
http://www.metacademy.org/

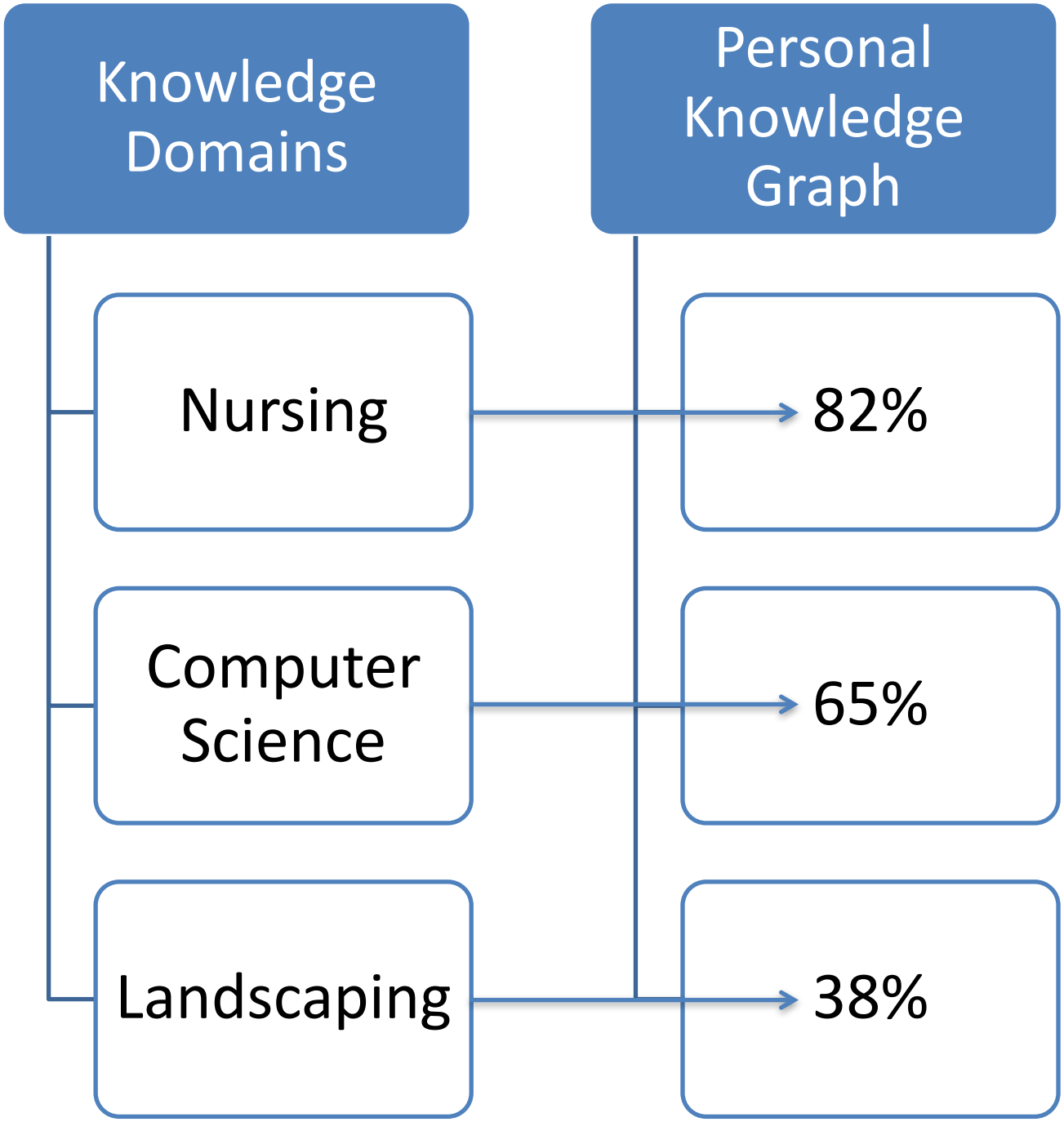
Personal Knowledge Graph

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

A network model of what we know

Learner-owned


Learner knowledge
Architecture of knowledge in a discipline
Degree/ Qualification
Developed through
Formal
Informal
Intelligent data


Knowledge Domains
Personal Knowledge Graph
Nursing
82%
Computer Science
65%
Landscaping
38%