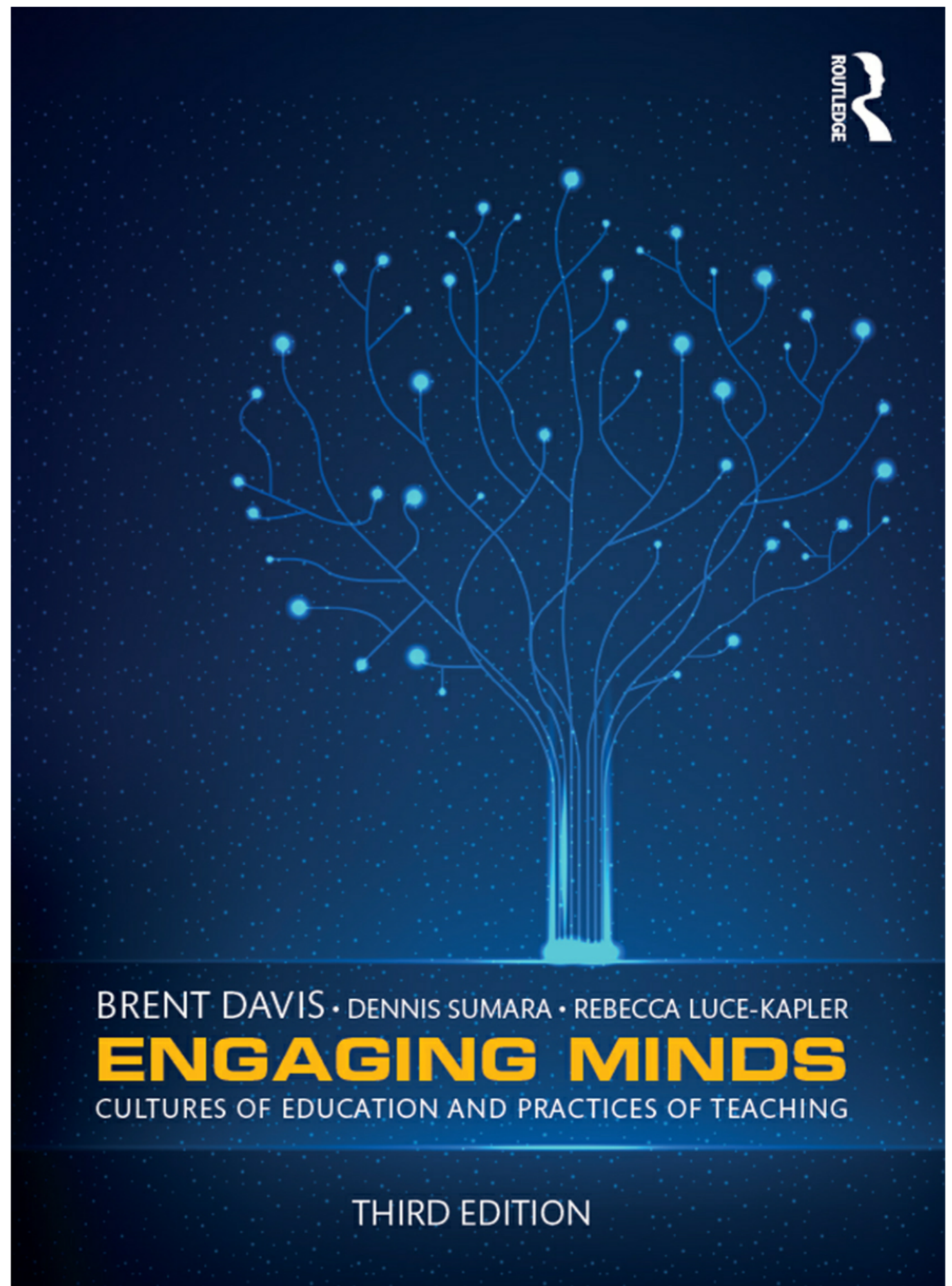# Systemic Sustainability Education
Part 1 - Introduction

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September 24, 2018

- I brought this book as a tool for brainstorming, only.
- This book is not a bible, but a chosen perspective to stimulate our conversation.
- You can have different perspective and notions. You don't have to be the same with me. You have a right to do that.
- Different perspective does not mean wrong perspective, as long as you can prove it logically and empirically.
- It is all about the 'research'.
- So, fantastic research is not to get empirical data within given framework, but rather to get different framework that can be proven empirically.
- It is all about 'understanding the educational world' from your own standpoint.

BRENT DAVIS · DENNIS SUMARA · REBECCA LUCE-KAPLER

ENGAGING MINDS

CULTURES OF EDUCATION AND PRACTICES OF TEACHING

THIRD EDITION

- [activity] What is Education, learning, and knowing? Define the meanings by groups. . .

Education	Learning	Knowing

Education	Learning	Knowing
Education is a **pedagogical tool** that includes the individual and the social content.	Learning is an **internal process** of individual **growth** which is lifelong and continuous.	Knowing is the **expression of learning** the start point of future learning
Education is a **formal process** that involves two or more people where all the actors start a **growing** path together. It's **more specific** compared to the other two processes. Focuses more on developing **human values**.	Learning is a **growth** continuous **open process** that comes from different **incentives** (formal, nonformal, and informal) that depend a lot on the **different environments**.	**Knowing** is a connected continuous process that involves **knowing**. Knowing how to be, knowing how to do (experience). *(tautology?)*
Education is a complex concept that is relatively with **formal education** and what you learn by relationship and parent is **informal education**. *(Education is education?)*	Learning is related with informal and nonformal education. (e.g. lifelong learning) *(So, what is learning anyway?)*	Knowing is an **acquisition of knowledge.** It is a cultural baggage. Without distinction among formal, nonformal, and informal education.
Education is a **building process** that aims to create a personal dimension and a collective one.	Learning is the **act of knowing something new**.	Knowing is **the result of our educational process**. *(Without education, no knowing?)*
Education is: the whole of moral **values**; **relationship**; **cognitive processes**; **development**; **emancipation**; double meaning (educare - to lead / edere - tp development)	Learning is: schooling; formal; lifelong learning; the whole of **competences and techniques**.	Knowing is: dymanic; **influenced by education and learning**
Education is a process that concerns the **transmission of cultural customs** for development and growth of the person in society	Learning is the **action of acquiring knowledge, skills, and abilities**	Knowing is **the result of information** received **through experience**.
Education is ex-ducere - **take out from someone; guide to learning to knowledge** so to life.	Learning is **intentional process in order to improve skills**.	Knowing is informal way to get to **know** or to be **informed** about something; enrichment process; informal approach

Learning is an **internal process** of individual **growth** which is lifelong and continuous.	Internal process, growth	Questions: – internal process: where is 'internal'? –
Learning is a **growth** continuous **open process** that comes from different **incentives** (formal, nonformal, and informal) that depend a lot on the **different environments**.	Growth, open process, environements	– What is environment? How it different from person? – – Learning is act of knowing. Then, what is knowing? --> They said "knowing is the result of educational process" redundancy?
Learning is related with informal and nonformal education. (e.g. lifelong learning) *(So, what is learning anyway?)*	Related with education	– – Action of acquiring knowledge - what do you mean by 'acquiring'?
Learning is the **act of knowing something new**.	Act of knowing new	
Learning is: schooling; formal; lifelong learning; the whole of **competences and techniques**.	Competences and skills(techniques)	– Acquisition – Pulling out (Draw) – Transmission – Growth
Learning is the **action of acquiring knowledge, skills, and abilities**	Action of acquiring knowledge. Skill , ability	
Learning is **intentional process in order to improve skills**.	Internal process, improve skills	

Encyclopedia Britannica

Education, **discipline** that is concerned with methods of **teaching** **and** **learning** (in schools or school-like environments) as opposed to various (nonformal and informal) means of **socialization** (e.g., rural development projects and education through parent-child relationships).

Education consists of teaching and learning, Education is NOT socialization

(continues...) Education can be thought of as the **transmission** of the values and accumulated knowledge of a society. In this sense, it is equivalent to what social scientists term socialization or enculturation. . . . But, as society becomes ever more complex and schools become ever more institutionalized, educational experience becomes less directly related to daily life.
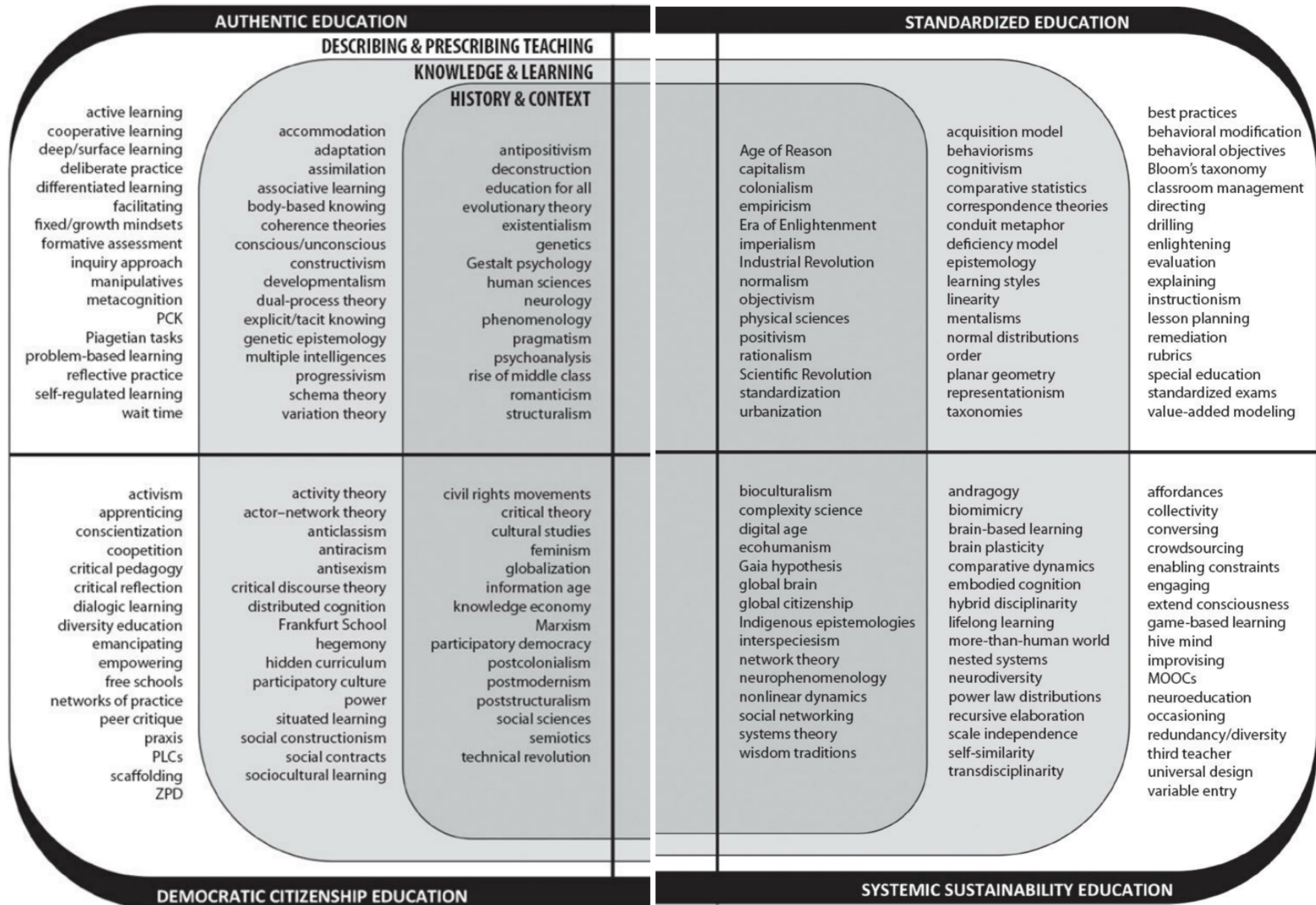
- To know.... = a starting point of human research.

- How can I 'know' a fact, like the earth is round?

- How can I 'know' that a fact (?), like my mind has grown up?

- How can we 'know' the external world? How teacher helps students 'know' history?

- Epistemology . . . a philosophy of 'knowing'

- Correspondence theory vs. coherence theory

- A triangle is a plane figure that has three straight bounding sides.
  - A triangle is one of many figures that has "plane figure"
  - All the plane figure that have not three straight bounding sides are NOT a triangle.

- Education is one of ____X____
- All Xs that have not ____Y____ are NOT Education.

- Learning is one of ____X____
- All Xs that have not ____Y____ are NOT Learning

- Education is a kind of _____
- Education consists of _____
- Education in NOT _____
- _____ are key conditions of Education

Finding out my Framework

- Your definition of education, learning, and knowing will fall into one (or multiple) of the following frameworks. You will identify, at the end of this lesson, which framework your definition mostly well fits in.

- Standardized Education, focusing on societal needs

- Authentic Education, focusing on individual possibilities

- Democratic Citizenship Education, focusing on connecting individual with collective intelligence in contextual and situational conditions.

- Systemic Sustainability Education, focusing on far more complex and self-referentially organizing 'learning system.'

DESCRIBING & PRESCRIBING TEACHING
KNOWLEDGE & LEARNING
HISTORY & CONTEXT

AUTHENTIC EDUCATION

Describing & Prescribing Teaching
- active learning
- cooperative learning
- deep/surface learning
- deliberate practice
- differentiated learning
- facilitating
- fixed/growth mindsets
- formative assessment
- inquiry approach
- manipulatives
- metacognition
- PCK
- Piagetian tasks
- problem-based learning
- reflective practice
- self-regulated learning
- wait time

Knowledge & Learning
- accommodation
- adaptation
- assimilation
- associative learning
- body-based knowing
- coherence theories
- conscious/unconscious
- constructivism
- developmentalism
- dual-process theory
- explicit/tacit knowing
- genetic epistemology
- multiple intelligences
- progressivism
- schema theory
- variation theory

History & Context
- antipositivism
- deconstruction
- education for all
- evolutionary theory
- existentialism
- genetics
- Gestalt psychology
- human sciences
- neurology
- phenomenology
- pragmatism
- psychoanalysis
- rise of middle class
- romanticism
- structuralism

STANDARDIZED EDUCATION

History & Context
- Age of Reason
- capitalism
- colonialism
- empiricism
- Era of Enlightenment
- imperialism
- Industrial Revolution
- normalism
- objectivism
- physical sciences
- positivism
- rationalism
- Scientific Revolution
- standardization
- urbanization

Knowledge & Learning
- acquisition model
- behaviorisms
- cognitivism
- comparative statistics
- correspondence theories
- conduit metaphor
- deficiency model
- epistemology
- learning styles
- linearity
- mentalisms
- normal distributions
- order
- planar geometry
- representationism
- taxonomies

Describing & Prescribing Teaching
- best practices
- behavioral modification
- behavioral objectives
- Bloom's taxonomy
- classroom management
- directing
- drilling
- enlightening
- evaluation
- explaining
- instructionism
- lesson planning
- remediation
- rubrics
- special education
- standardized exams
- value-added modeling

DEMOCRATIC CITIZENSHIP EDUCATION

Describing & Prescribing Teaching
- activism
- apprenticing
- conscientization
- coopetition
- critical pedagogy
- critical reflection
- dialogic learning
- diversity education
- emancipating
- empowering
- free schools
- networks of practice
- peer critique
- praxis
- PLCs
- scaffolding
- ZPD

Knowledge & Learning
- activity theory
- actor–network theory
- anticlassism
- antiracism
- antisexism
- critical discourse theory
- distributed cognition
- Frankfurt School
- hegemony
- hidden curriculum
- participatory culture
- power
- situated learning
- social constructionism
- social contracts
- sociocultural learning

History & Context
- civil rights movements
- critical theory
- cultural studies
- feminism
- globalization
- information age
- knowledge economy
- Marxism
- participatory democracy
- postcolonialism
- postmodernism
- poststructuralism
- social sciences
- semiotics
- technical revolution

SYSTEMIC SUSTAINABILITY EDUCATION

History & Context
- bioculturalism
- complexity science
- digital age
- ecohumanism
- Gaia hypothesis
- global brain
- global citizenship
- Indigenous epistemologies
- interspeciesism
- network theory
- neurophenomenology
- nonlinear dynamics
- social networking
- systems theory
- wisdom traditions

Knowledge & Learning
- andragogy
- biomimicry
- brain-based learning
- brain plasticity
- comparative dynamics
- embodied cognition
- hybrid disciplinarity
- lifelong learning
- more-than-human world
- nested systems
- neurodiversity
- power law distributions
- recursive elaboration
- scale independence
- self-similarity
- transdisciplinarity

Describing & Prescribing Teaching
- affordances
- collectivity
- conversing
- crowdsourcing
- enabling constraints
- engaging
- extend consciousness
- game-based learning
- hive mind
- improvising
- MOOCs
- neuroeducation
- occasioning
- redundancy/diversity
- third teacher
- universal design
- variable entry

STANDARDIZED EDUCATION

DESCRIBING & PRESCRIBING TEACHING

KNOWLEDGE & LEARNING

HISTORY & CONTEXT

HISTORY & CONTEXT	KNOWLEDGE & LEARNING	DESCRIBING & PRESCRIBING TEACHING
Age of Reason	acquisition model	best practices
capitalism	behaviorisms	behavioral modification
colonialism	cognitivism	behavioral objectives
empiricism	comparative statistics	Bloom's taxonomy
Era of Enlightenment	correspondence theories	classroom management
imperialism	conduit metaphor	directing
Industrial Revolution	deficiency model	drilling
normalism	epistemology	enlightening
objectivism	learning styles	evaluation
physical sciences	linearity	explaining
positivism	mentalisms	instructionism
rationalism	normal distributions	lesson planning
Scientific Revolution	order	remediation
standardization	planar geometry	rubrics
urbanization	representationism	special education
	taxonomies	standardized exams
		value-added modeling

AUTHENTIC EDUCATION

DESCRIBING & PRESCRIBING TEACHING

KNOWLEDGE & LEARNING

HISTORY & CONTEXT

active learning		
cooperative learning		
deep/surface learning		
deliberate practice		antipositivism
differentiated learning	accommodation	deconstruction
facilitating	adaptation	education for all
fixed/growth mindsets	assimilation	evolutionary theory
formative assessment	associative learning	existentialism
inquiry approach	body-based knowing	genetics
manipulatives	coherence theories	Gestalt psychology
metacognition	conscious/unconscious	human sciences
PCK	constructivism	neurology
Piagetian tasks	developmentalism	phenomenology
problem-based learning	dual-process theory	pragmatism
reflective practice	explicit/tacit knowing	psychoanalysis
self-regulated learning	genetic epistemology	rise of middle class
wait time	multiple intelligences	romanticism
	progressivism	structuralism
	schema theory	
	variation theory	

activism	activity theory	civil rights movements
apprenticing	actor–network theory	critical theory
conscientization	anticlassism	cultural studies
coopetition	antiracism	feminism
critical pedagogy	antisexism	globalization
critical reflection	critical discourse theory	information age
dialogic learning	distributed cognition	knowledge economy
diversity education	Frankfurt School	Marxism
emancipating	hegemony	participatory democracy
empowering	hidden curriculum	postcolonialism
free schools	participatory culture	postmodernism
networks of practice	power	poststructuralism
peer critique	situated learning	social sciences
praxis	social constructionism	semiotics
PLCs	social contracts	technical revolution
scaffolding	sociocultural learning	
ZPD		

HISTORY & CONTEXT

KNOWLEDGE & LEARNING

DESCRIBING & PRESCRIBING TEACHING

DEMOCRATIC CITIZENSHIP EDUCATION

bioculturalism	andragogy	affordances
complexity science	biomimicry	collectivity
digital age	brain-based learning	conversing
ecohumanism	brain plasticity	crowdsourcing
Gaia hypothesis	comparative dynamics	enabling constraints
global brain	embodied cognition	engaging
global citizenship	hybrid disciplinarity	extend consciousness
Indigenous epistemologies	lifelong learning	game-based learning
interspeciesism	more-than-human world	hive mind
network theory	nested systems	improvising
neurophenomenology	neurodiversity	MOOCs
nonlinear dynamics	power law distributions	neuroeducation
social networking	recursive elaboration	occasioning
systems theory	scale independence	redundancy/diversity
wisdom traditions	self-similarity	third teacher
	transdisciplinarity	universal design
		variable entry

HISTORY & CONTEXT

KNOWLEDGE & LEARNING

DESCRIBING & PRESCRIBING TEACHING

SYSTEMIC SUSTAINABILITY EDUCATION

I would say...

- Education is an intentional activity to facilitate learning. **Education consists of teaching and learning.**

- Learning is an intentional (unintentional?) activity to achieve knowing. **Learning consists of knowing.**

- Then, **what is knowing**? Knowing is a fundamental phenomenon that constructs the notion of learning or education.

- The way we **understanding the notion of knowing constructs different approaches to educational researches**.

- For example,

The word *teaching* traces back to the Proto-Indo-European word *deik-*, meaning "to point out." Its most ancient meanings, then, are about orienting attentions and alerting consciousness. In fact, the index finger was once known as "the teaching finger," or simply "the teacher."

Truth is 'out there' and we point out the truth, or 'teach' the truth out there. But, really the truth is out there?

The word *education* derives from Latin *educare*, which in turn derives from *ex-* + *ducere*, "to lead/draw out." The first uses in English date back to the mid-1400s.

Again? The dichotomy of 'in and out': But, what is to be drawn out? Nothing is 'coming out'

The word *inducting* is derived from the same root as *educating*, originally meaning "to pull/draw in." Whereas the focus on TEACHING AS EDUCATING was drawing out a student's inner self, the metaphor of TEACHING AS INDUCTING shifted attentions to pulling a student into a grander order (usually the Church).

Hum... now you 'draw in? Not draw out?' Should I always be dragged to somewhere else? I like to be staying where I am......

If we were pressed to choose an icon for Standardized Education, it would be the arrow. The image is implicit in some of the movement's defining principles. Instances include …

… the belief that *teaching causes learning*, which is tied to a linear, cause ⇨ effect sensibility …

… the conception of *progress* through schooling, which is framed as incremental movement along a linear trajectory …

… notions of *orders* and *hierarchies*, which pervade disciplines, achievement levels, administrative structures …

Teaching causes learning? So 'linear'?

The higher we go up, the closer to Truth.
The lower we stay there, the closer to False.
God has answer, always.
We have to do is...

Much of early formal education was organized around an assumption of the *great chain of being* (Latin *scala naturae*, "ladder of nature"), a concept derived from the ancient Greeks. Assumed to be ordained by the universe, the great chain of being is a strict hierarchical ordering of all matter and life. It starts at God and moves downward to angels, demons, stars, moon, kings, princes, nobles, men, wild animals, domesticated animals, trees, other plants, precious stones, precious metals, and other minerals.

Lecture is to read a preset truth, which will not change forever, to students

Reader (academic rank)

The title of **reader** in the United Kingdom and some universities in the Commonwealth of Nations, for example India, Australia and New Zealand, denotes an appointment for a senior academic with a distinguished international reputation in research or scholarship. Academic ranks above senior lecturer and below professor,

The word *lesson* has the same distant roots as the word *lecture*, tracing back to the Latin *lectionem*, "a reading." It was first used in English in the early 1200s in the context of religious education to refer to an oral reading from the Bible.

Standardized Education embodied most of the stated assumptions

- Standardized Education - "The society needs workers and citizens

- Authentic Education

- Democratic Citizenship Education

- Systemic Sustainability Education

The industrial factory served as more than a metaphor for the school of the Age of Enlightenment. Buidlings for the standardized school were actually modeled after the factory – as is evident in this image. It's not immediately clear whether the building depicted is a school or a

The assembly line, with its parsed and sequenced subtasks, was the major inspiration for a modern curriculum design. As discussed in Chapter 1.2, one of the reasons the model was so powerful was that it meshed with emergent metaphors of knowledge (as an OBJECT) and learning (as ACQUISITION).
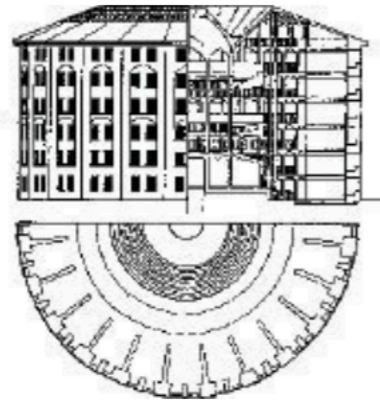
The factory wasn't the only influence on the design of the modern school building.

In the 1700s, an innovative prison design called the *panopticon* (from the Greek *pan-* + *optikon*, "all + for sight") was developed so guards could observe every inmate from a single vantage point. The idea was soon adopted and adapted by many of society's institutions, including hospitals, asylums, … and schools.
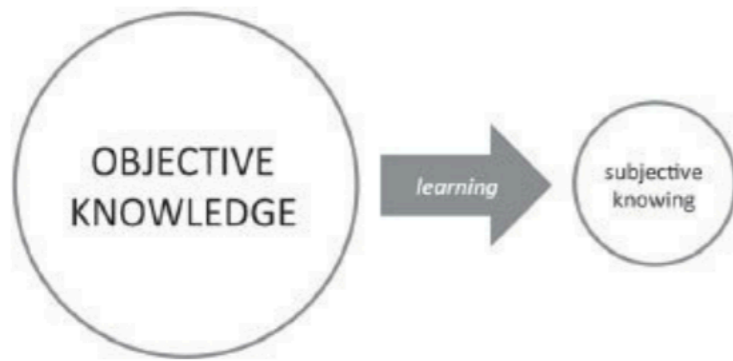
Those perspectives on learning that assume this sort of outside-to-inside process are known as **correspondence theories** of learning. In a nutshell, within this category, learning is understood in terms of creating a subjective internal model or map of an objective outer world – by which "truth" and "correctness" comes to defined in terms of the level of match (or correspondence). A more *accurate* inner model or map is more *right*.

A *correspondence theory* is one in which learning is understood in terms of acquiring, projecting, or building an internal model that corresponds to an external reality. This category is also known as *representationism* – that is, learning is about constructing an internal representation an outer reality.

(Note: although the word *construct* is frequently used within these theories, t

See Chapters 2.2 and 3.2 for a description of that category.)

The most commonsensical correspondence theories are known as *mentalisms* – which, as illustrated here, are built on an assumption that a knower has an internal model or map of am external reality. The most popular mentalism at the moment is the one that uses the specific metaphor, BRAIN AS COMPUTER, which is known as *cognitivism*.

The word *epistemology* was coined in the mid-1800s to mean "theory of knowledge," and there's more than a little irony in this definition. The word is derived from the Greek *episteme*, "know-how" – which, as detailed in Chapter 1.1, was part of a dyad. Its complement, *gnosis*, "deep knowledge of the universe," is the root of the word *knowledge*.

In other words, in defining epistemology as the theory of knowledge, *episteme* eclipses *gnosis*. Truths and facts are separated from and made superior to unvalidated beliefs.

Learner is a container that contains knowledge objects, without changing it "Delivery error must not happen"

KNOWLEDGE IS AN OBJECT.

⬇

LEARNING IS TAKING THINGS IN.

⬇

THE LEARNER IS A CONTAINER.

⬇

INTELLIGENCE IS THE CAPACITY OF THE CONTAINER.
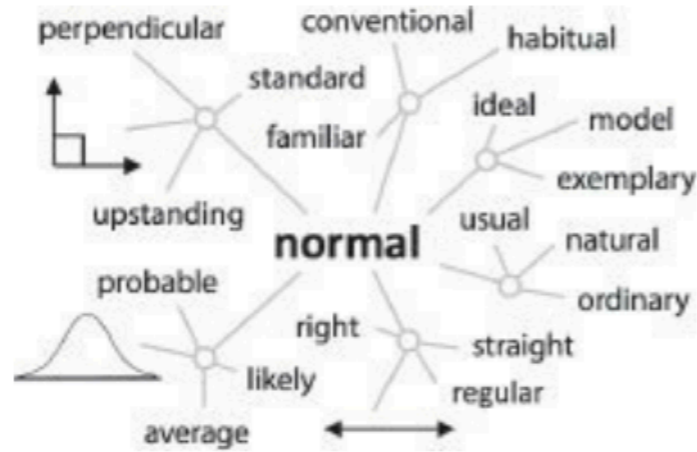
The word *normal* has become such a *familiar, natural, regular, likely, standard* part of everyday discourse that it's easy to ignore its baggage.

That's also true of a *normal distribution*. This commonly used mathematical model presents two important pieces of information: the *mean* (or *average* or *norm* or *standard*) at the center and the measure of divergence (or *standard deviation*) from the norm.
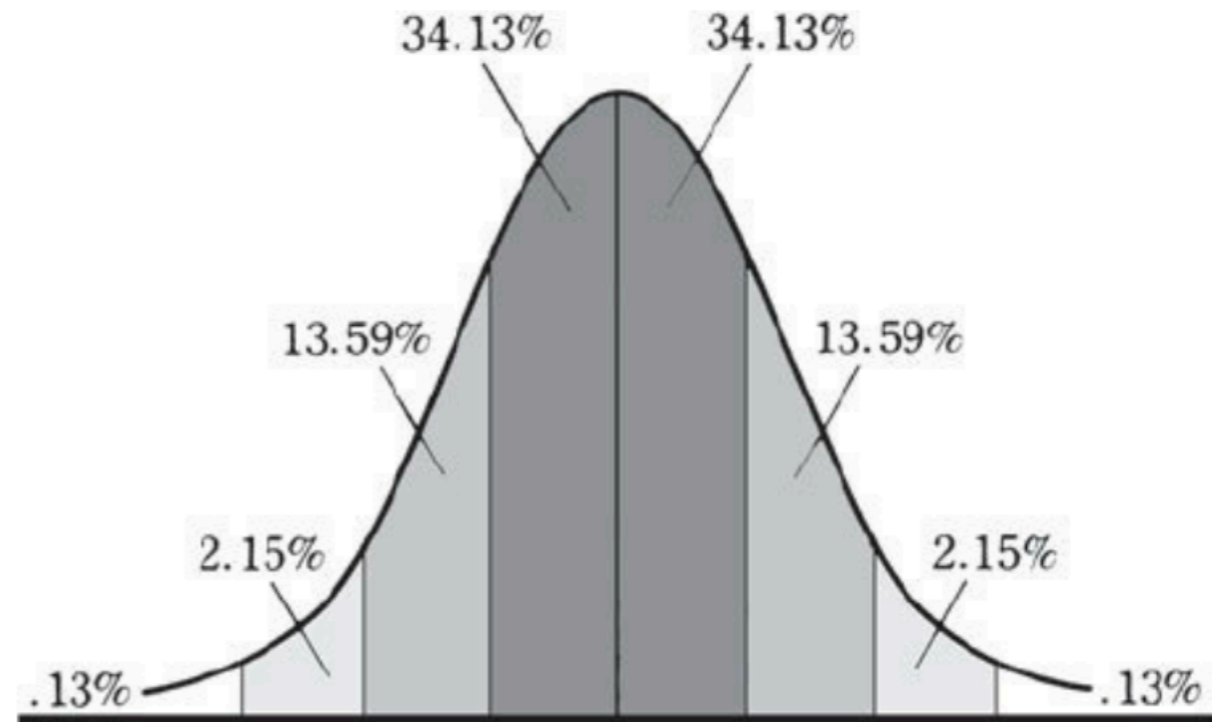
Beijing Normal University (1902)
Illinois State Normal University (1857)
Ottawa Normal School (1874)
Ecole Normal Supérieure (1794)

......

The first teacher education institutions were known as *normal schools*, so named because their purpose was to provide a standardized/normal model of teaching practice. The first normal schools were established in Europe in the 1800s.

- Standardized Education

- Authentic Education - "you are so special"

- Democratic Citizenship Education

- Systemic Sustainability Education

Critique on Conduit Model

STEP 1

Package thought.

STEP 2

COMMUNICATION CHANNEL

Shunt container through conduit.

STEP 3

Unpack container.

THOUGHT CONTAINER

THOUGHT CONTAINER
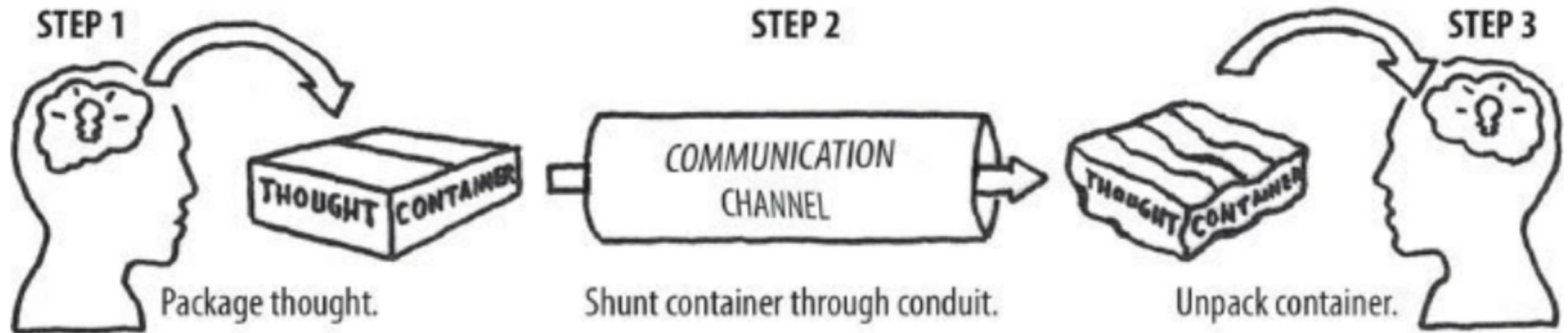
Even though there is no evidence to support the "conduit model" of communication, it is so entrenched that most English speakers take if for granted.

(Imaging a Correspondence Theory)

OBJECTIVE KNOWLEDGE → *learning* → subjective knowing

Standardized Education Advocates: "Learning is transmitting objective knowledge, which is corresponding to the truth 'out there.'"

In Chapter 2.1, we offered the above image as a visual metaphor for commonsense theories of knowledge and learning associated with Standardized Education. This graphic is intended to be suggestive of a metaphors of KNOWLEDGE AS OBJECT and LEARNING AS ACQUISITION.

Crafting a visual metaphor of the theories of knowing and learning associated with Authentic Education is a much more difficult task. Few images call to mind notions of dynamic coherence, ongoing adaptation, and ever-increasing levels of sophistication.

(Imaging a Coherence Theory)
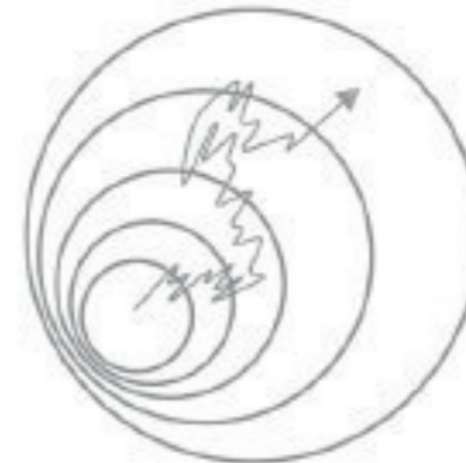
Authentic Learning Advocates: "Learning takes non-linear movements. Every learner has authentic movement of learning"

Even so, we find the above graphic useful for highlighting some key elements. In it, the jagged line represents learning, and is intended as a reminder of the nonlinear movement associated with the development of a concept. The nested circles reflect levels of knowing, as moments of assimilation (motions inside a particular level) and accommodations (crossing a boundary into a qualitatively different way of thinking) contribute to a more encompassing, more powerful schema.

- Standardized Education

- Authentic Education

- Democratic Citizenship Education - "we, together, situational context is important."

- Systemic Sustainability Education
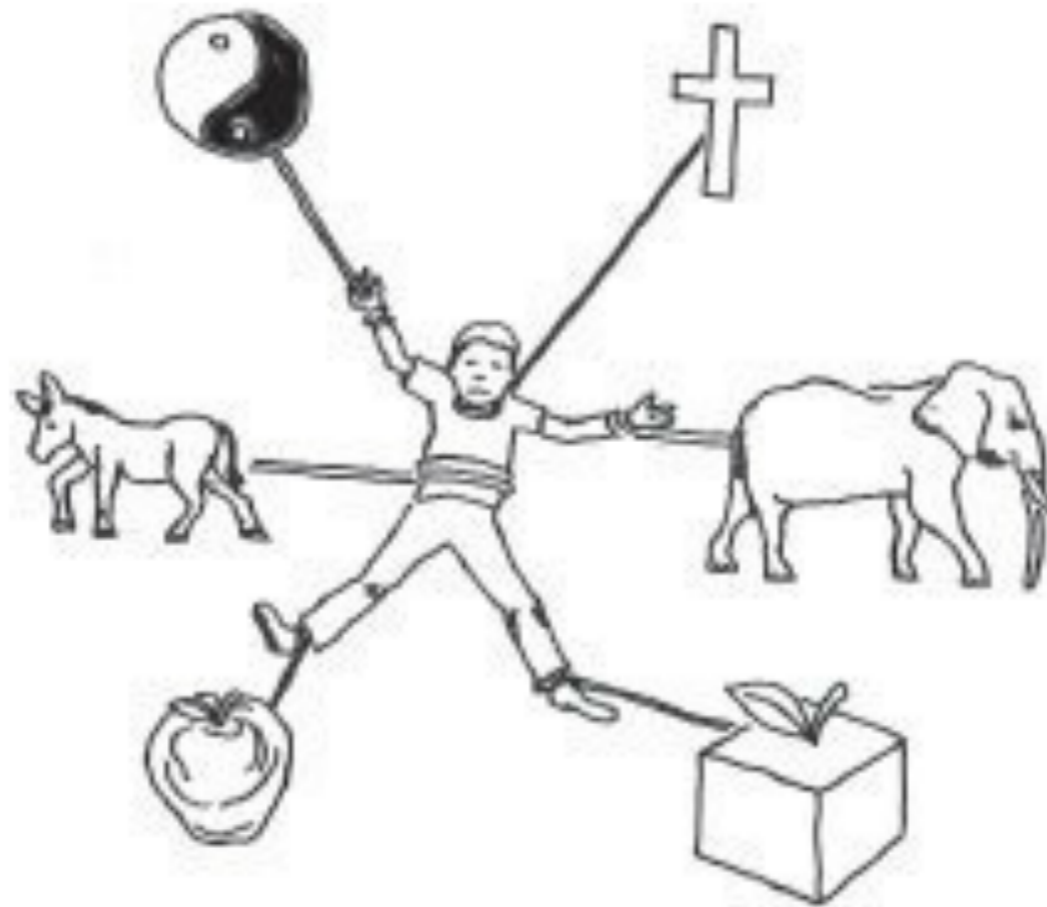
Contradictory, competing knowledge and perspectives pulls out to every direction.

Learning is situational, social, and we are constructing the truth together...

In popular parlance, *discourse* usually refers to modes of communication. Within academic domains associated with Democratic Citizenship Education, the term refers more specifically to the entire ecosystem modes of communication, vocabularies, belief structures, and so on that frame what is knowable, doable, and be-able.

Competing discourses are always in play.

Participation, democracy in constructing social realities. Feminism, social constructionism, critical theory, etc.

The word *participatory* first entered popular usage in the phrase "participatory democracy," used within student protests of the 1960s. Since then, it has been taken up in many domains, including education where it has lost its activist edge.

Participatory has the same deep roots as *partial*, namely the Latin *pars*, "part" – and the sense of being part of a grander whole is critical to understanding the notion. Being participatory is much more than playing a role; it is also about sharing in, partaking of, contributing to, and sharing responsibility for.

Collective wisdom is better than one genius
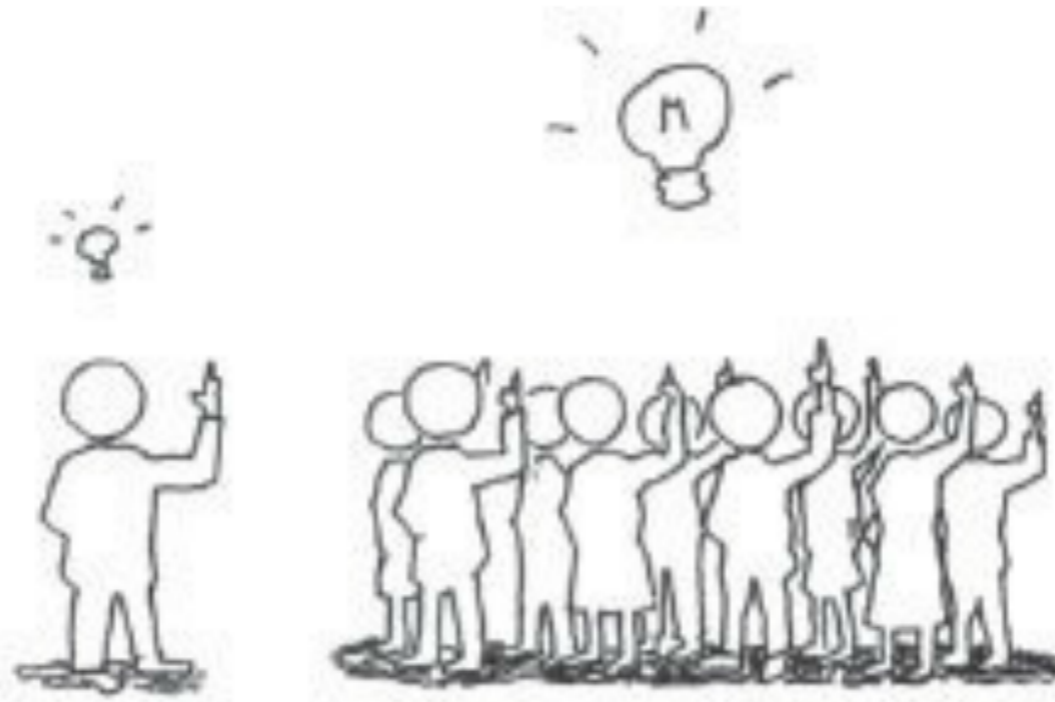
In the past few decades, collectivity has been profoundly reframed, as evidenced by current interests in *hive mind* (or *group mind*, or *swarm intelligence*, or *interhinking*), used to refer to the potential capacities of a collective. Along similar lines, *crowdsourcing* is a neologism that refers to processes of soliciting contributions from a large group of people (especially from an online community) to address a matter or solve a problem of shared interest.

- Standardized Education

- Authentic Education

- Democratic Citizenship Education

- Systemic Sustainability Education

Knowing is "Complex" phenomenon. Therefore, Learning and Education are also complex phenomena

Previous Education seems to regard Human beings as superior, detached from the world

- Human beings are used to think to them as superior beings in comparison with other species and to the rest of the world

- They are experiencing deep crises triggered by these beliefs (pollution, warming ...)

- Dichotomy: human VS nature / mind VS body

- We need to shift the fundamental epistemology

Systemic sustainability education.

- Education links human beings with the complexities he experiences.
- For example: when talking about man and health we consider also:
  - personal and cultural, neurological and epigenetic wellbeing (micro level)
  - As well as ecosystemic and global wellbeing (macro level)

- **Human beings are parts of learning system** (where "learning" connects with vibrant, living and learning systems)

We need Complexity Thinking to understand the world differently

- To help educators to comprehend the growing complexity of their role without feeling overwhelmed by this, we need to adopt *complexity thinking:* a transdisciplinary academic movement that is concerned to understand those systems that are learning/living
- *Complex = Gestalt:* the whole is greater then the sum of its parts

Complexity: some definitions

1. Complexity is comparative dynamics
2. Complexity is the study of emergent trans-phenomena
3. Complexity refers to a category pof phenomena with specific qualities
4. Complexity is distinct from complicated
5. Complexity is the study of learning systems

1. Complexity is comparative dynamics

Complexity refers to the ability to:

- work *structurally coupled* with others (organs, persons, subjects, objects...)
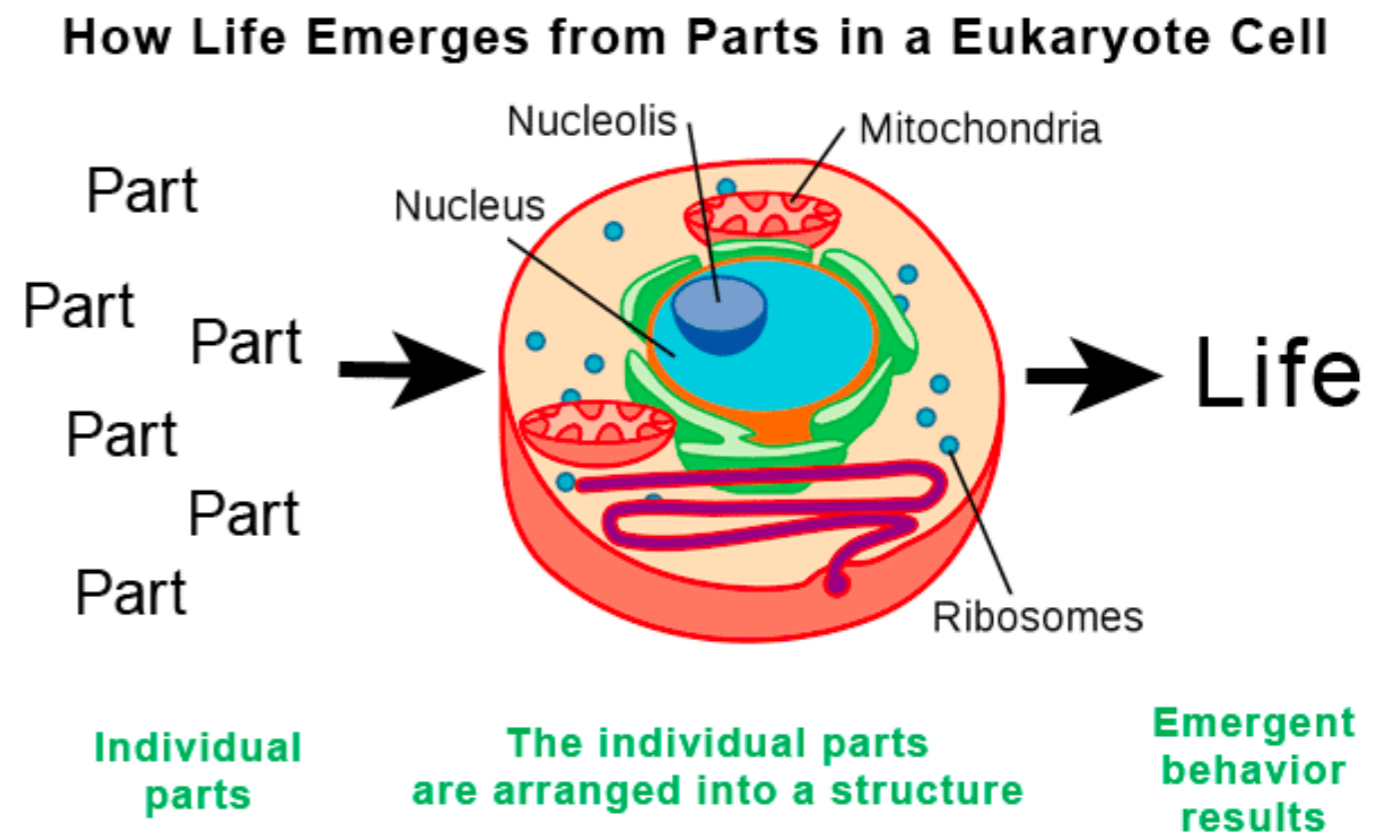- Be *responsive* and *adaptive*

Dynamic systems are active and energetic
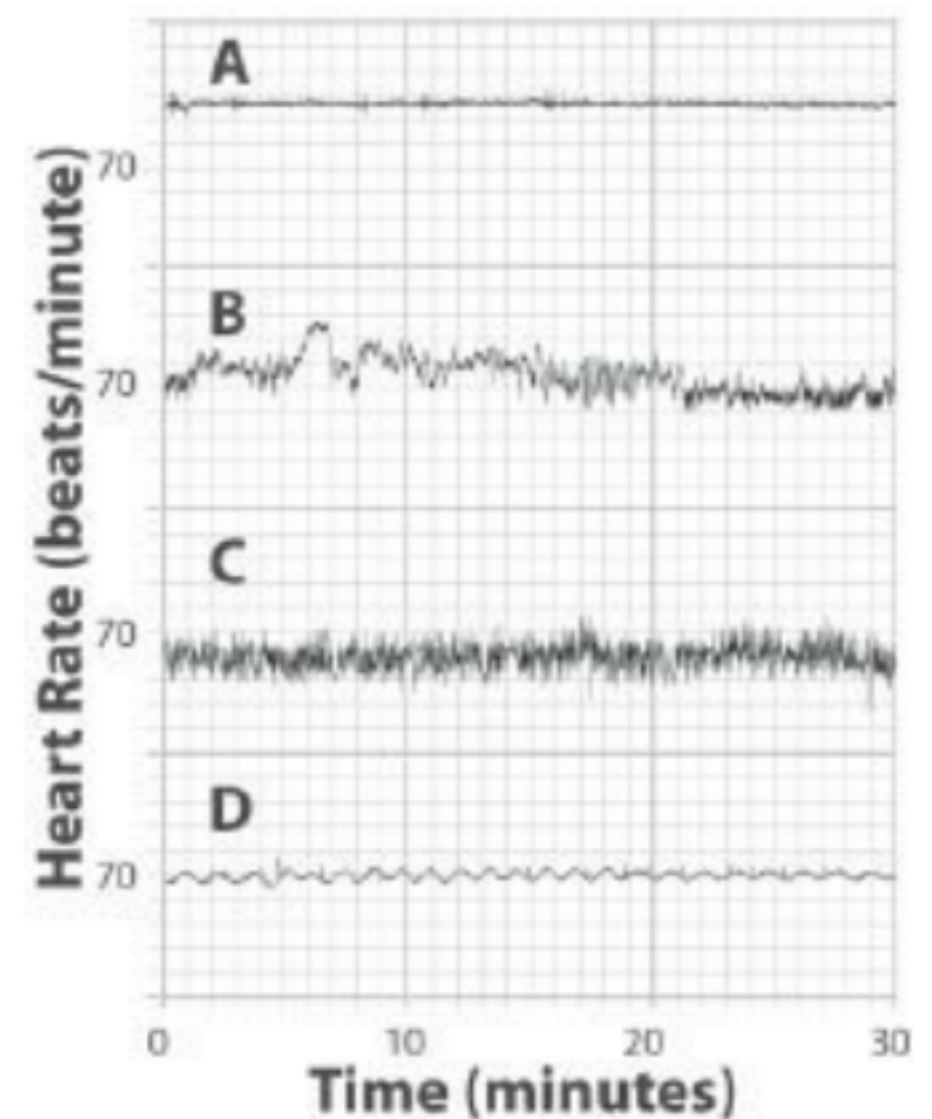
Which, if any, of the traces of heart activity is indicat[ed]

heart? (The answer is discussed to the right.)

2. Complexity is the study of emergent trans-phenomena

- Emergent = cannot be reduced to fundamental parts; *arises* in the entangled interactions in the process; shows new properties and behaviours that are not being seen before in any other agent/ subsystem.

How Life Emerges from Parts in a Eukaryote Cell

Nucleolis   Mitochondria

Nucleus

Part

Part   Part   →   → Life

Part

Part

Part

Ribosomes

Individual parts

The individual parts are arranged into a structure

Emergent behavior results

Diagram by Thwink.org

2. Complexity is the study of emergent transphenomena

- *Transphenomena:* parts of grander systems →

- To understand them we need to study across more levels of organization
  - Obesity can be triggered by genetic, viral, subpersonal reasons...
  - https://www.youtube.com/watch?v=XS0i0b_K5_E
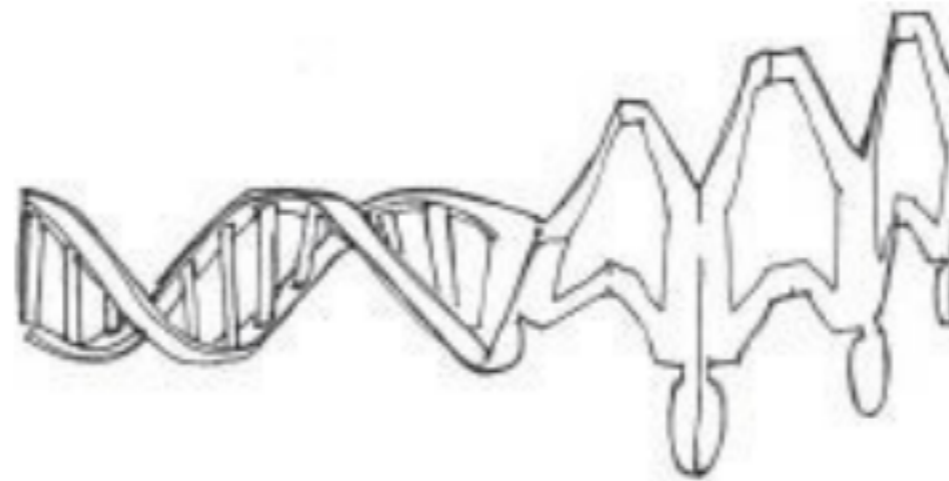
A *transphenomenon* is a form or event that cannot be well understood by looking only at a single level of organization. Obesity, for example, manifests itself on the individual level, but the fact it is an international epidemic suggests it must be studied at the collective level. At the same time, there are indications of genetic, viral, and other triggers, indicating it must also be studied at the subpersonal level.

3. Complexity: phenomena with specific qualities. Complex forms can,

- Self-organize
- Self-detemine
- Far-from-Equilibrium
- Be organized in decentralized networks
- Scale independent

Autopoiesis

Self-referential

Self-organizational

"Drawing hands" by Dutch artist M. C. Escher

Social Systems Theory:

- Humberto Marurana
- Niklass Luhmann
- Autopietic system
- System vs. environments
- Operationally closed
- "the concept of self-reference designates the unity that an element, a process, or a system is for itself(Luhmann, 1984/1995, p. 33)
- "systems are operationally closed, and they rely entirely on internal operations(Luhmann, 2002, p. 64)."
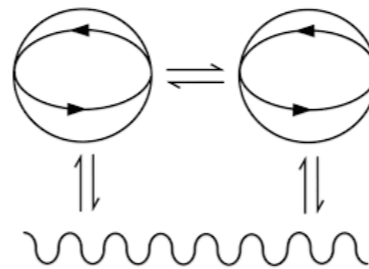
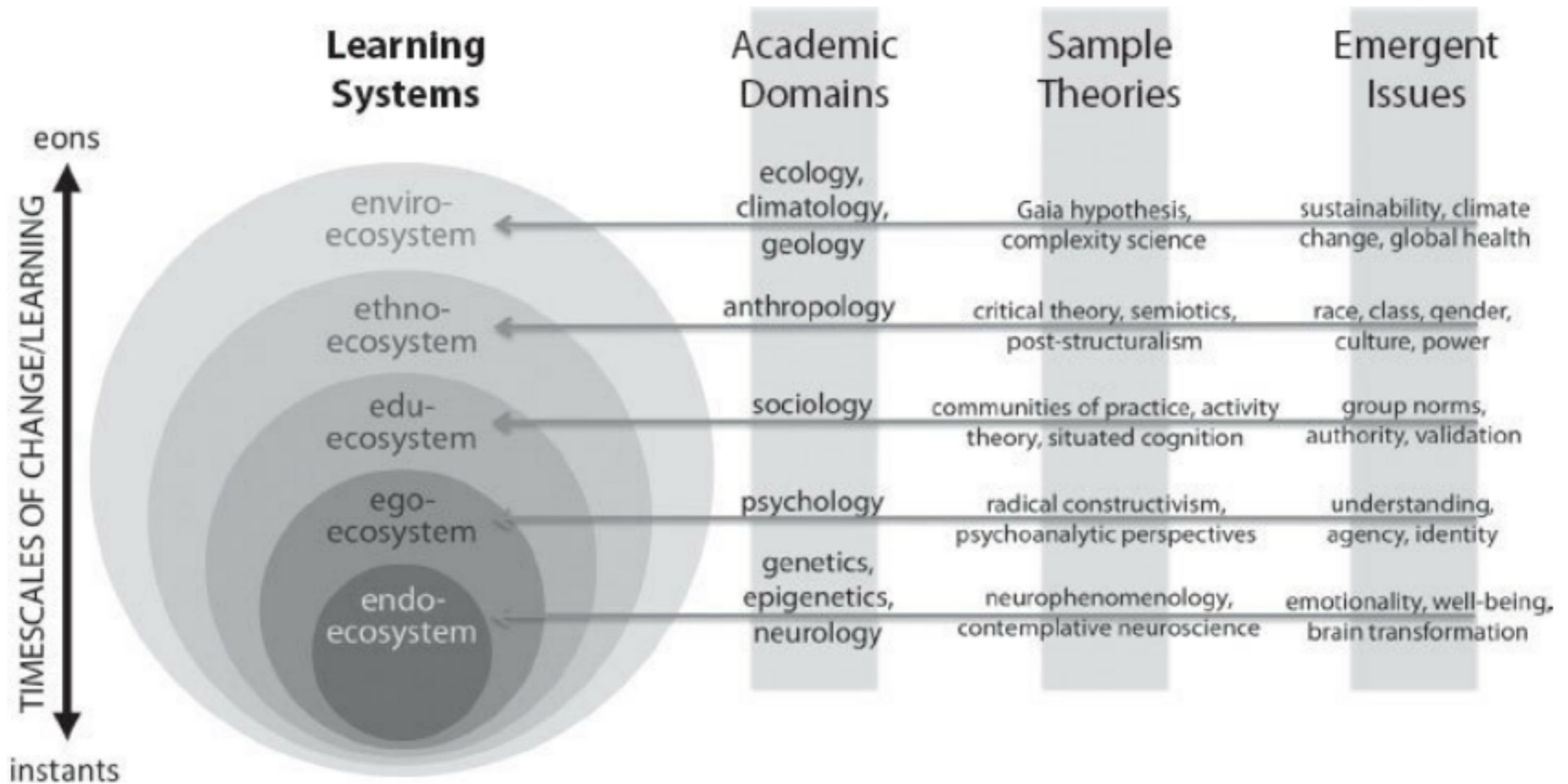# 4. Complexity is distinct from complicated

- Complicated systems are predictable and result from the sum of their parts and follow linearity
  - physics, engineering
- Complex systems cannot be reduced to their parts, they are spontaneous and unpredictable, are context dependent
- (biology).

Complex .... A particular status that has some typical characteristics
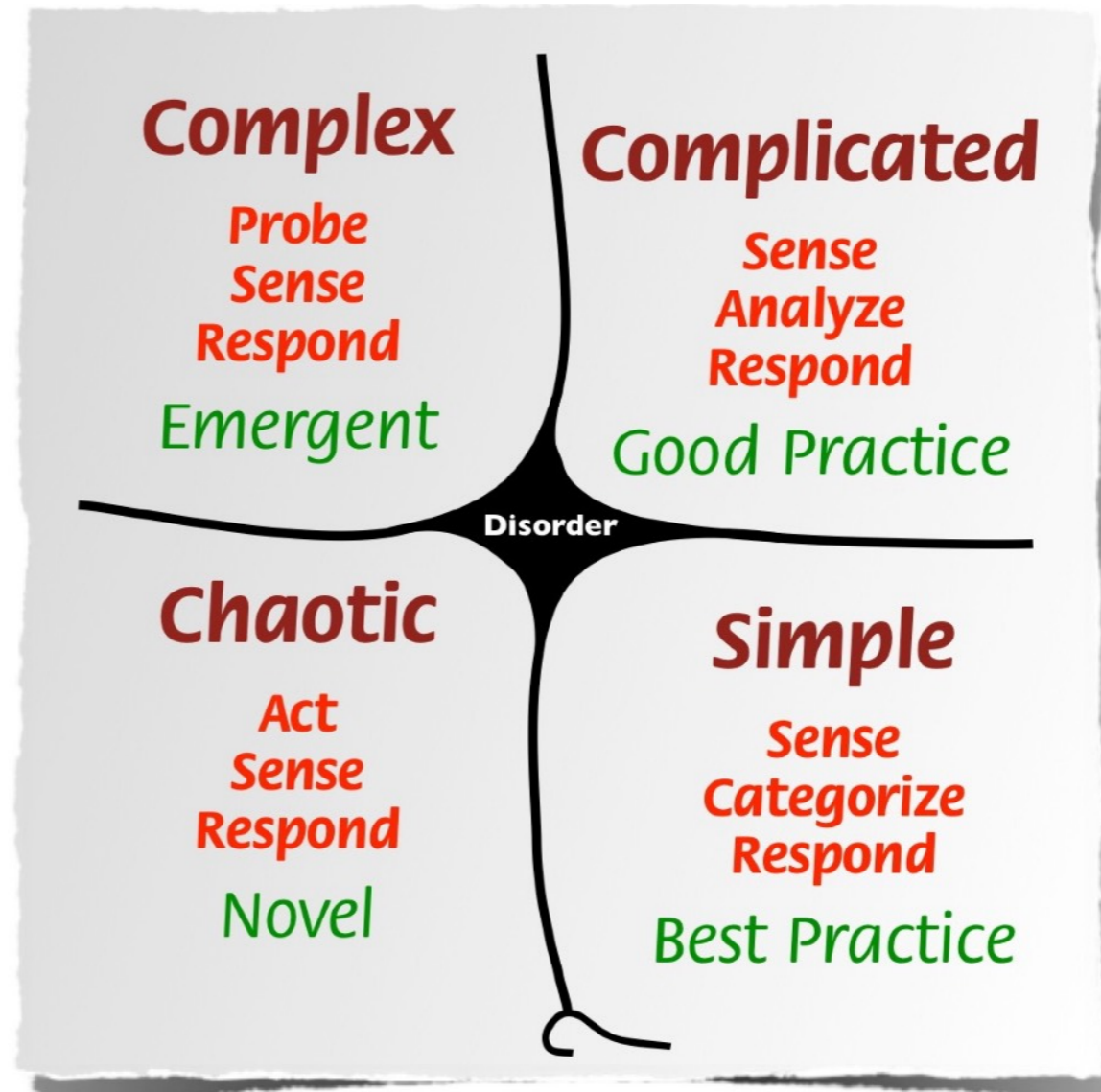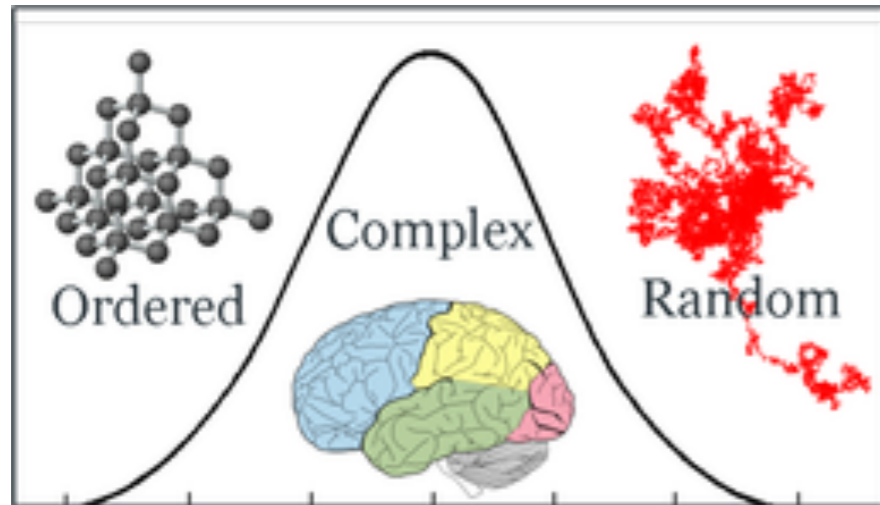
5. Complexity: the study of learning systems

- Complex systems are learners.
- (Learners are a Complex system)
- All living systems are learning systems
- They adapt with and in other learning systems - interconnected, horizontally and vertically
- They can be in *conversation* with others

Learning Systems	Academic Domains	Sample Theories	Emergent Issues
enviro-ecosystem	ecology, climatology, geology	Gaia hypothesis, complexity science	sustainability, climate change, global health
ethno-ecosystem	anthropology	critical theory, semiotics, post-structuralism	race, class, gender, culture, power
edu-ecosystem	sociology	communities of practice, activity theory, situated cognition	group norms, authority, validation
ego-ecosystem	psychology	radical constructivism, psychoanalytic perspectives	understanding, agency, identity
endo-ecosystem	genetics, epigenetics, neurology	neurophenomenology, contemplative neuroscience	emotionality, well-being, brain transformation

eons

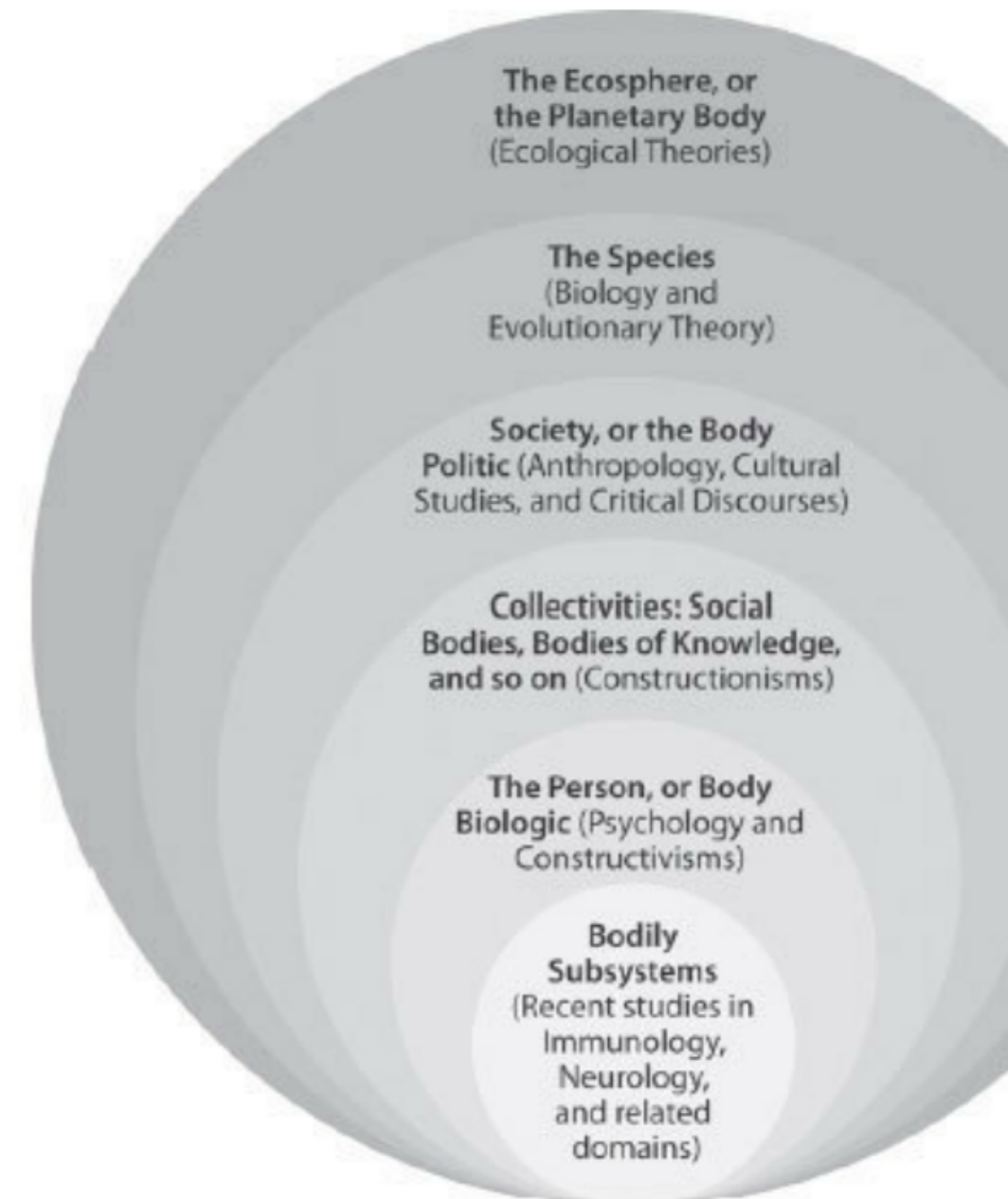TIMESCALES OF CHANGE/LEARNING

instants

Subpersonal and superpersonal level

- The study of education, we need to consider human beings in their complexity, connecting the subpersonal and the superpersonal levels.

Education needs to link to:
- Human sciences
- Social sciences
- Physical sciences
- Complexity sciences

The Ecosphere, or the Planetary Body (Ecological Theories)

The Species (Biology and Evolutionary Theory)

Society, or the Body Politic (Anthropology, Cultural Studies, and Critical Discourses)

Collectivities: Social Bodies, Bodies of Knowledge, and so on (Constructionisms)

The Person, or Body Biologic (Psychology and Constructivisms)

Bodily Subsystems (Recent studies in Immunology, Neurology, and related domains)

Let's come back to my last lesson. Do you remember my question?

"Can a society be an agent of learning? I assumed 'learning society' is a society that learns.

Yes, it can. But still the learning at societal level does not work alone, but works interlinked with sub-society level (which is individuals) as well as super-society level (which is Environment or Mother Earth).

If, education is complex, then ...

- How should we adapt the complexity into designing researches, collecting data, and interpreting the research outcomes?

- If a society (as well as educational activities in it) is complex, how the characteristics (e.g. self-organizing, complex rather than complicated, self-determine, scale independece, decentralized. . . etc.) can be considered in our research methodologies? ... difficult question...

How to "Think systemically" in your qualitative researches? For example...

- How to understand the research object (teachers and learners)?
- How to understand the context, or the relationship between researcher, the researched, and the surrounding context?
- How to understand the changing processes (knowing, learning, teaching, human growth, perception, acquisition,understanding. . .)?

... You tell me.