



# Systemic Sustainability Education

## Part 1 - Introduction

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After created the world, God realized he made a huge mistake. Adam and Eve were illiterates, barely remembering what they were ordered to obey. Concerned with the 'tree of knowledge' happening again, He decided to educate them.

In the beginning, God created education. The education was formless and empty.

*The first day*, God said "Let there be letters", and there were letters. So the people were divided into the literates and the illiterates.

*The second day*, God created Eden of education to be a holy place ceremonial by learning and teaching. God saw that it was good.

*The third day*, God called the Eden 'school' and separated the form of learning into formal, non-formal, and informal. And it was so.

*The fourth day*, God upgraded 'the tree of knowledge (of good and evil)' at the center of the Eden, to produce various fruits of knowledge. He called it 'university'.

*The fifth day*, God so loved those who cannot read and write with compassion, so he sent his only begotten Son, 'adult education', to save them.

*The sixth day*, God finally finished his work by making the whole world full of education, so He ordered "all life should live long in learning and education", which today we call it 'lifelong learning and lifelong education'.

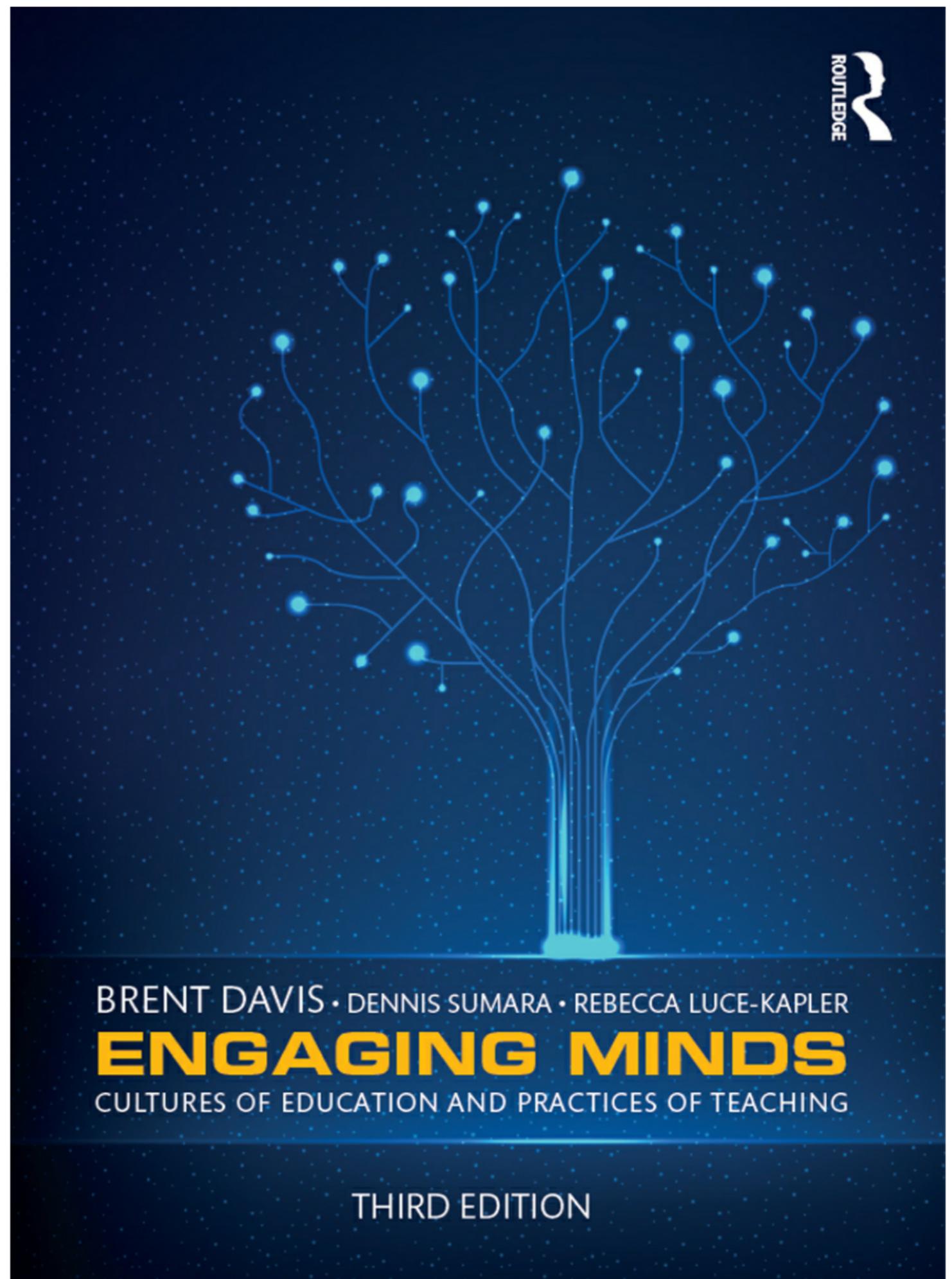
*The seventh day*, God rested.

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

<b>Education</b>	<b>Learning</b>	<b>Knowing</b>

- Plural definitions are possible.
- The definitions are all correct, within the boundaries of conceptual Frameworks.
- Each framework has different assumptions on educational theory and practices.
- The author of "Engaging Minds" bring four different sets of frameworks

- 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.

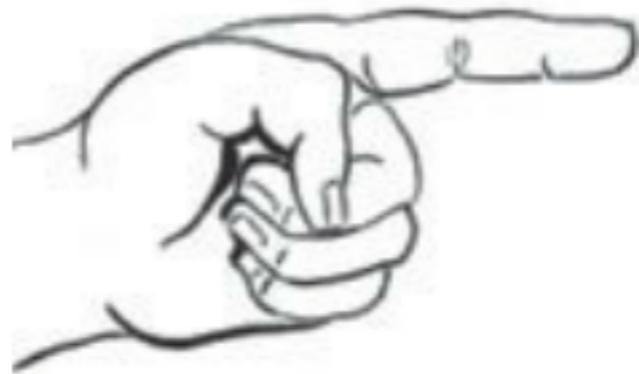


# Finding out my Framework

- 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.'



**Now, let's begin a trip of concepts  
to what we have already known before.....**



**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.”**



**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.**

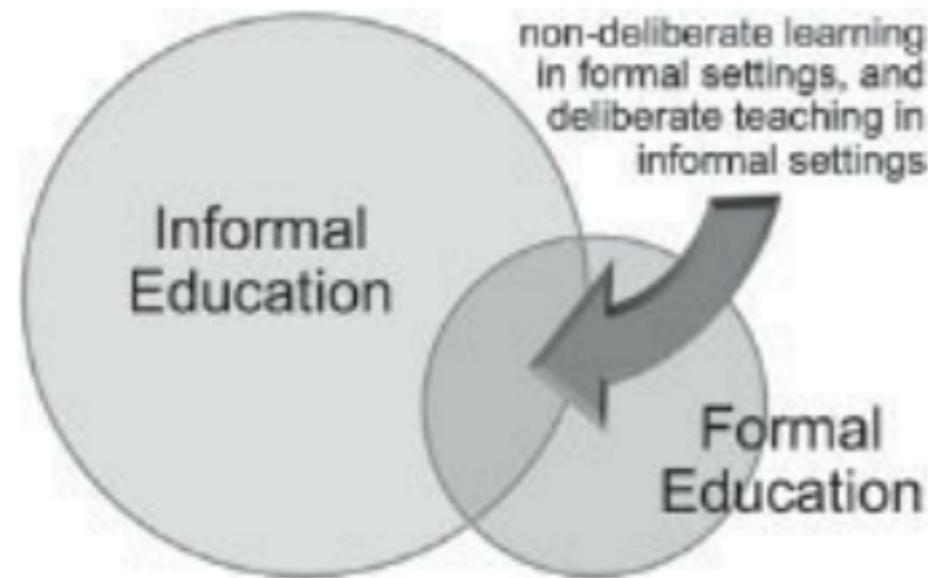


**If we were pressed to choose an icon for Standardized Education, it would be the arrow. The image is implicit in some of the movement's defining principles. Instances include ...**

**... the belief that *teaching causes learning*, which is tied to a linear, cause  $\Rightarrow$  effect sensibility ...**

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

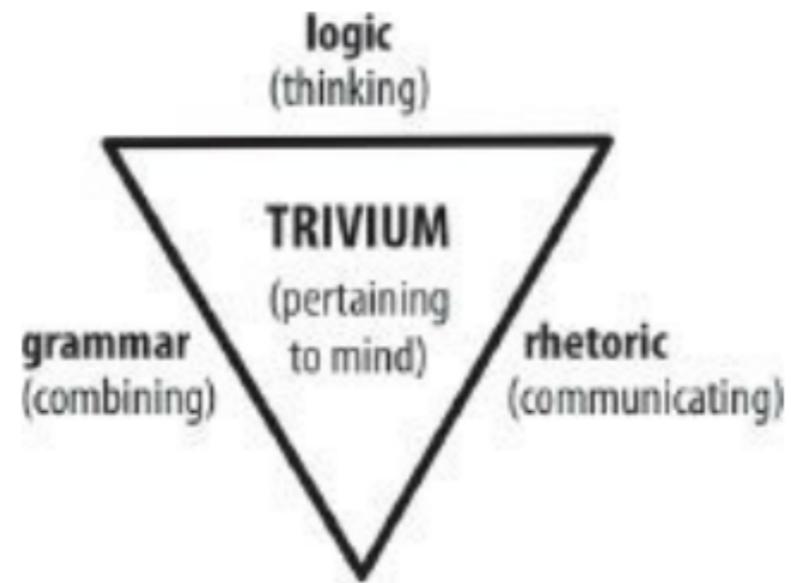
**... notions of *orders* and *hierarchies*, which pervade disciplines, achievement levels, administrative structures ...**



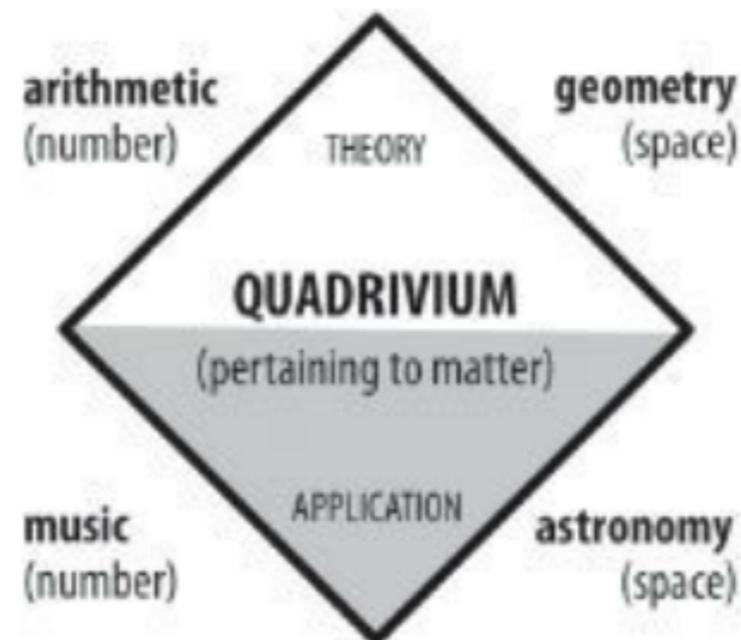
**When the modifier *formal* is used in describe to *education*, it refers to deliberately structured, institution-based activities. (In contrast, *informal education* refers to settings that have less structured curriculum and teaching but are still learning-focused, such as museums, playgrounds, and zoos.)**

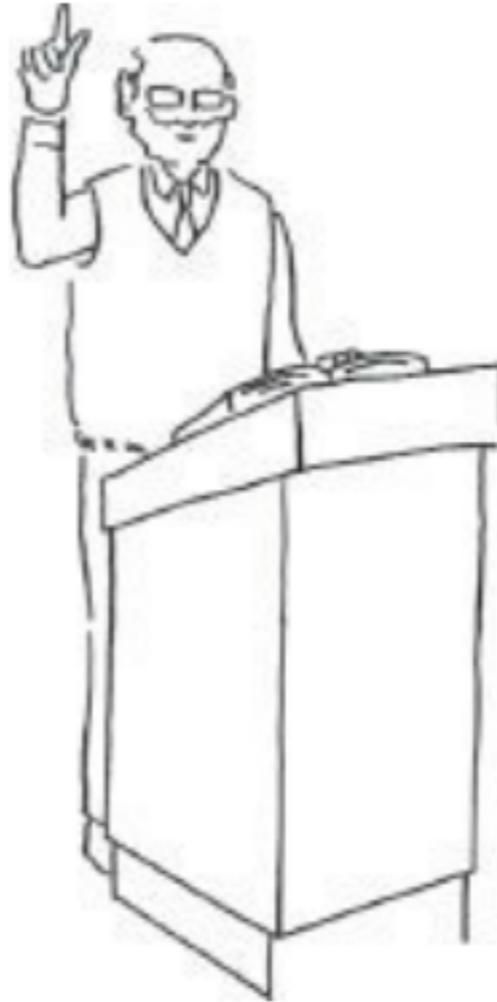


**The word *school* is derived from Greek *skhole*, “spare time, leisure, ease; learned discussion,” as exemplified in Raphael’s masterpiece *The School of Athens*. The current meaning of “a building for instruction” was first recorded in the 1590s. This usage is associated with a shift in conceptions of knowledge, as *episteme* (practical know-how) eclipsed *gnosis* (deep, spiritual knowledge).**



**The forerunners of the modern school were mainly concerned with the *liberal arts*, which means “arts that are freeing.” The arts served as both curriculum content and pedagogical approach. It was assumed that *gnosis*-knowledge was so elusive and so complex that simplistic, direct instruction was inadequate to support deep, meaningful learning.**





**Lecturer = reader**

**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.**



**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).**



**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.**

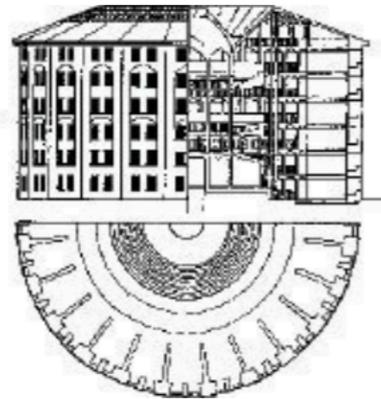
- Standardized Education
- Authentic Education
- Democratic Citizenship Education
- Systemic Sustainability Education



**The industrial factory served as more than a metaphor for the school of the Age of Enlightenment. Buildings 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**

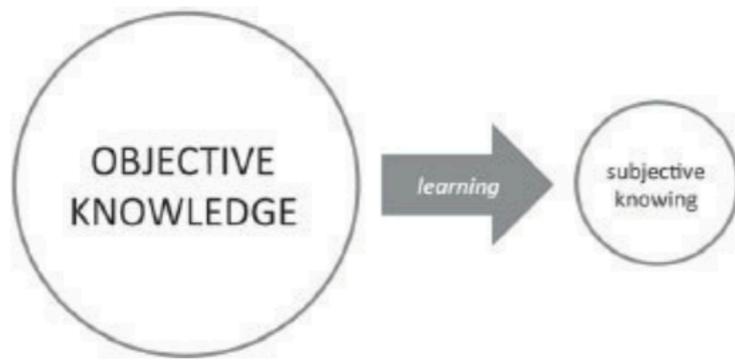


**The assembly line, with its parsed and sequenced subtasks, was the major inspiration for a modern curriculum design. As discussed in [Chapter 1.2](#), one of the reasons the model was so powerful was that it meshed with emergent metaphors of knowledge (as an OBJECT) and learning (as ACQUISITION).**

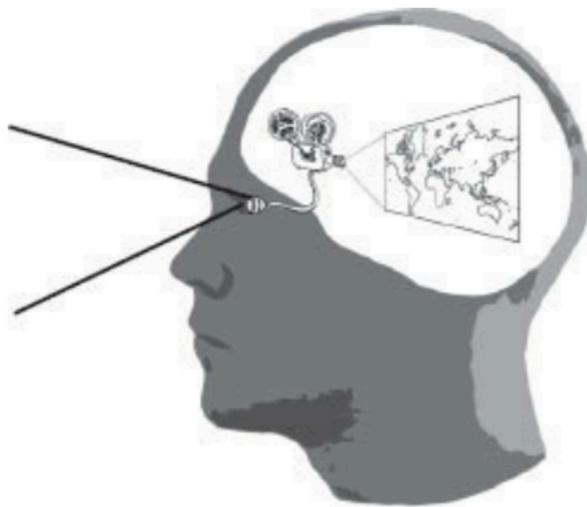


**The factory wasn't the only influence on the design of the modern school building.**

**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.**

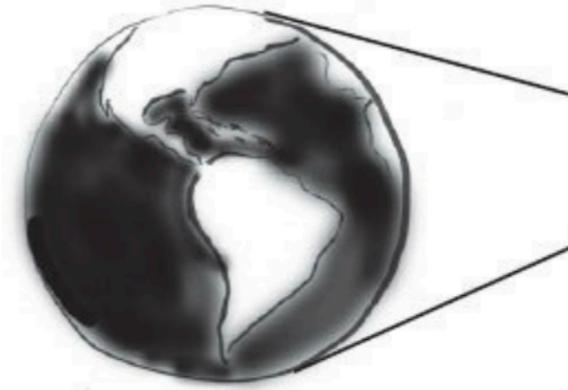


Those perspectives on learning that assume this sort of outside-to-inside process are known as **correspondence theories** of learning. In a nutshell, within this category, learning is understood in terms of creating a subjective internal model or map of an objective outer world – by which “truth” and “correctness” comes to be defined in terms of the level of match (or correspondence). A more *accurate* inner model or map is more *right*.



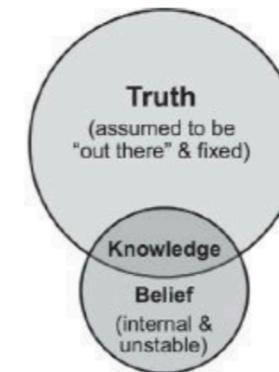
See [Chapters 2.2](#) and [3.2](#) for a description of that category.)

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 an 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*.



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 of an outer reality.

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



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.

KNOWLEDGE IS AN OBJECT.



LEARNING IS TAKING THINGS IN.



THE LEARNER IS A CONTAINER.



INTELLIGENCE IS THE CAPACITY OF THE CONTAINER.



KNOWLEDGE IS AN OBJECT/THING.



LEARNING IS TAKING KNOWLEDGE-THINGS IN.



THE LEARNER IS A CONTAINER OF KNOWLEDGE-THINGS.



TEACHING IS DELIVERING CONTENT TO THE CONTAINER.

KNOWLEDGE IS A CONSTRUCTABLE OBJECT.



LEARNING IS PUTTING THINGS TOGETHER.

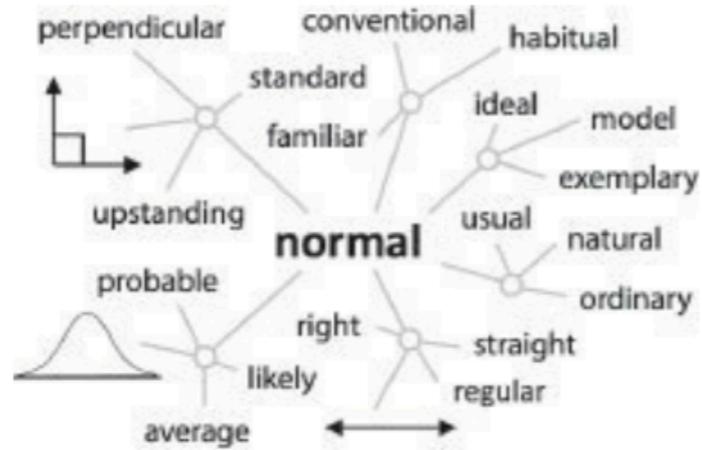


THE LEARNER IS A BUILDER.



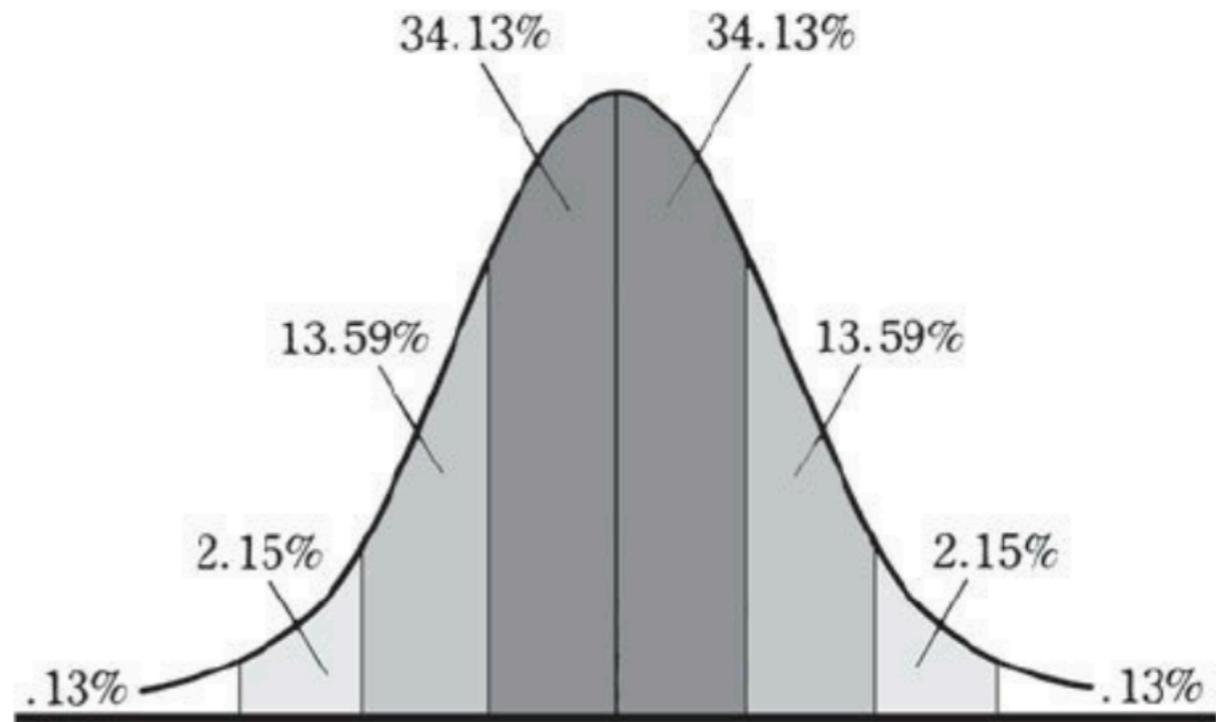
TEACHING IS INSTRUCTING

***Intelligence* is defined in many different ways. All of these images serve as visual metaphors for intelligence within a frame of Standardized Ed where the phenomenon is most often characterized in terms of MEASURABLE CAPACITIES – including abilities to retain facts, to perform skills, and to notice similarities.**



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

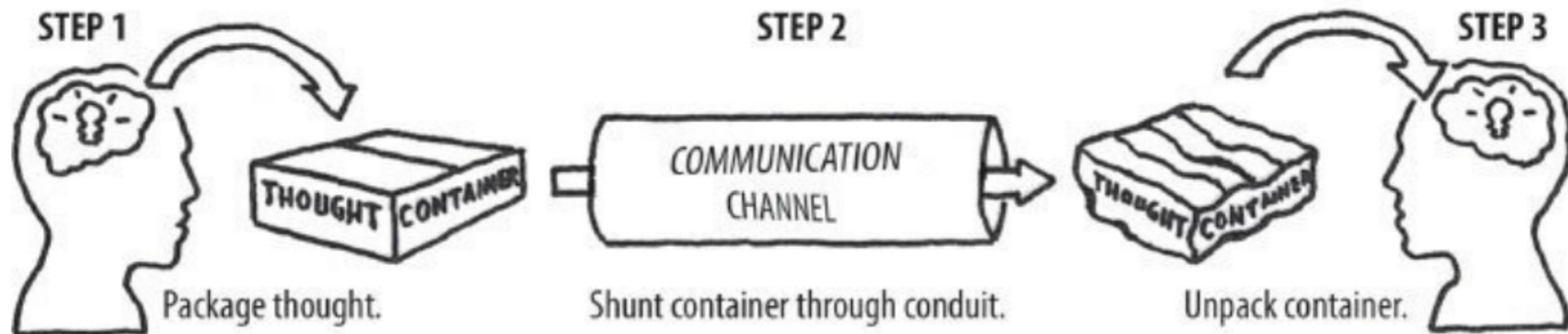
That's also true of a *normal distribution*. This commonly used mathematical model presents two important pieces of information: the *mean* (or *average* or *norm* or *standard*) at the center and the measure of divergence (or *standard deviation*) from the norm.





**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
- Democratic Citizenship Education
- Systemic Sustainability Education



**Even though there is no evidence to support the “conduit model” of communication, it is so entrenched that most English speakers take it for granted.**

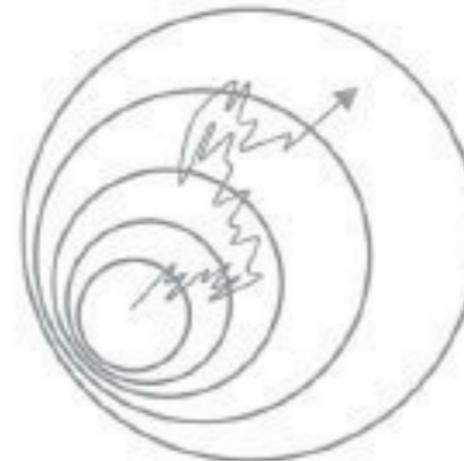
### (Imaging a Correspondence Theory)



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.

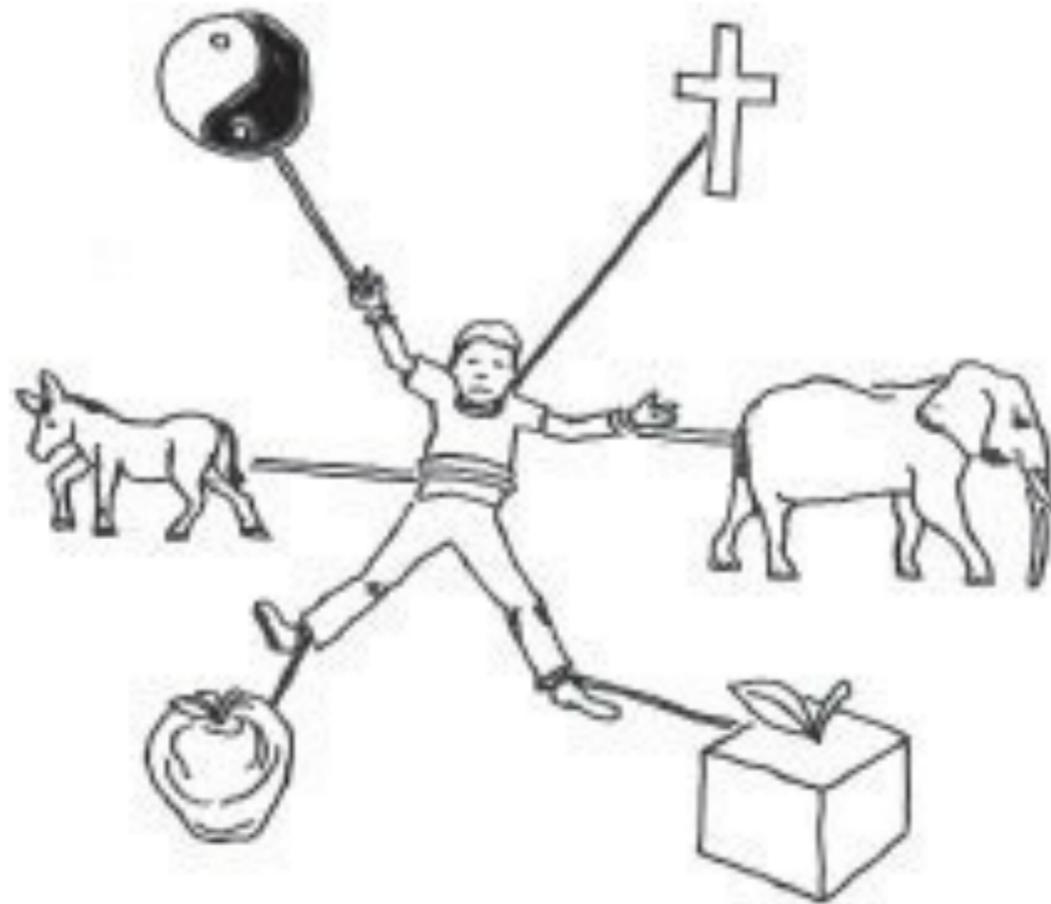
Crafting a visual metaphor of the theories of knowing and learning associated with Authentic Education is a much more difficult task. Few images call to mind notions of dynamic coherence, ongoing adaptation, and ever-increasing levels of sophistication.

### (Imaging a Coherence Theory)



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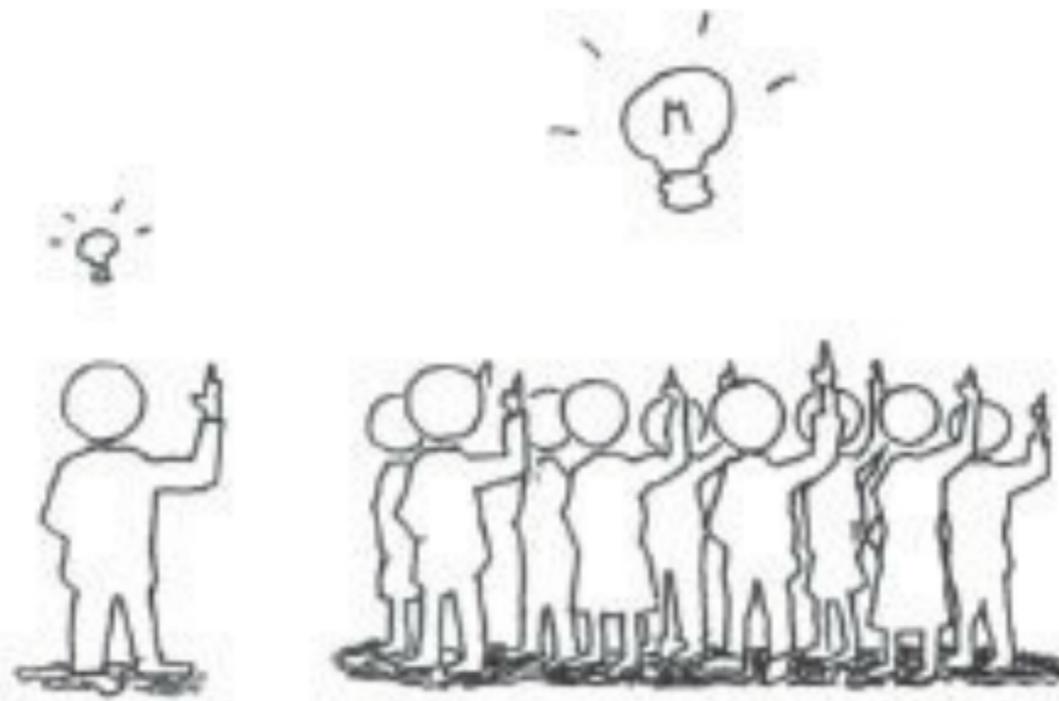
**In popular parlance, *discourse* usually refers to modes of communication. Within academic domains associated with Democratic Citizenship Education, the term refers more specifically to the entire ecosystem modes of communication, vocabularies, belief structures, and so on that frame what is knowable,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

**Competing discourses are always in play.**



**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.**



**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
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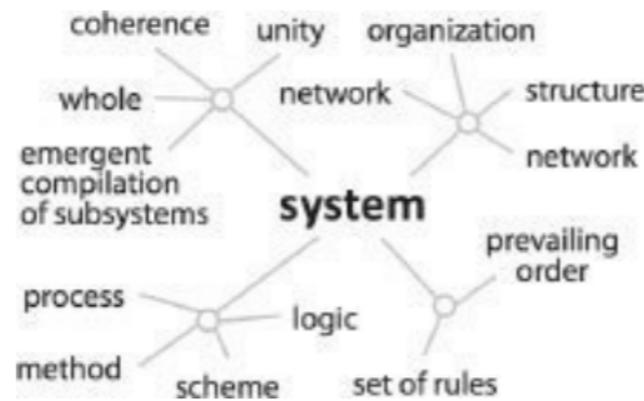
- Intro
- Thinking systemically
  - Meaning 1: Comparative Dynamics vs. Comparative Statistics
  - Meaning 2: The study of emergent transphenomena
  - Meaning 3: type of phenomenon with specific qualities
  - Meaning 4: distinct from complicated
  - Meaning 5: the study of learning systems
- The subpersonal through superpersonal
- The bottom line



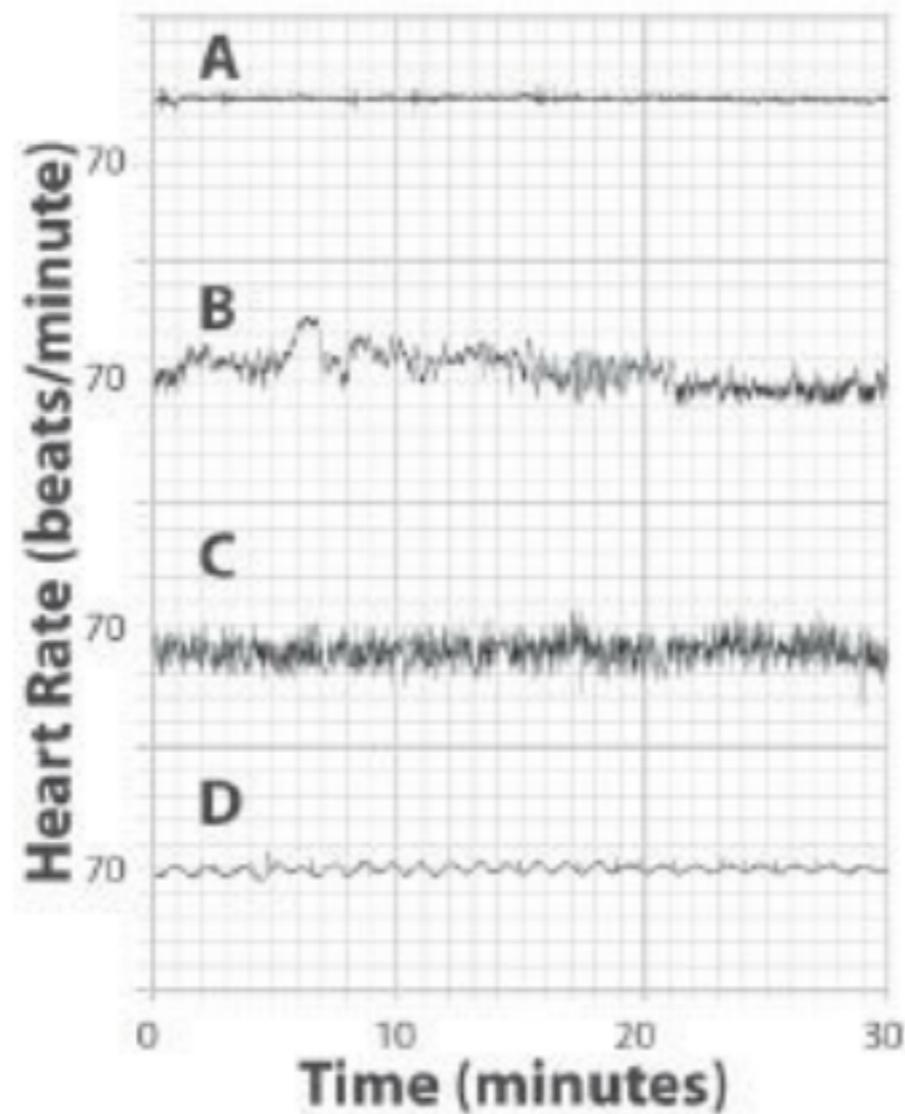
**At its root, the word *sustainability* refers to the capacity to endure, but it also had an important dimension of nurturing. Most sustainability discourses focus on long-term societal viability, which has physiological, psychological, social, economic, political, cultural, economic, and environmental dimensions.**

## **Global sustainability issues**

**Standardized Education has not paid attention to**



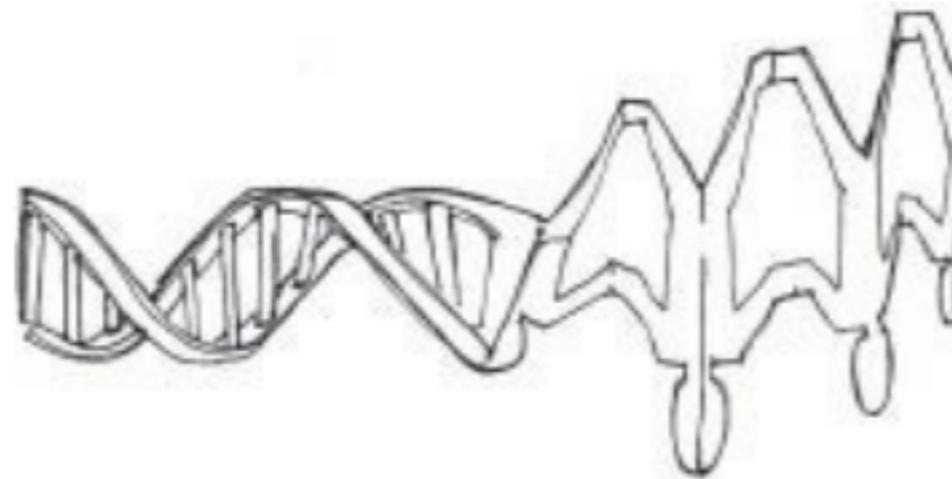
**Most generally, the word *system* refers to a whole comprising multiple components working together – whether mechanical (an engine, a computer, etc.) or organic (a body, an ecosystem, etc.). We use it here more in reference to organic forms, consistent with its original meanings. When *system* entered the English language in the early 1600s, it meant “the whole creation, the universe.”**



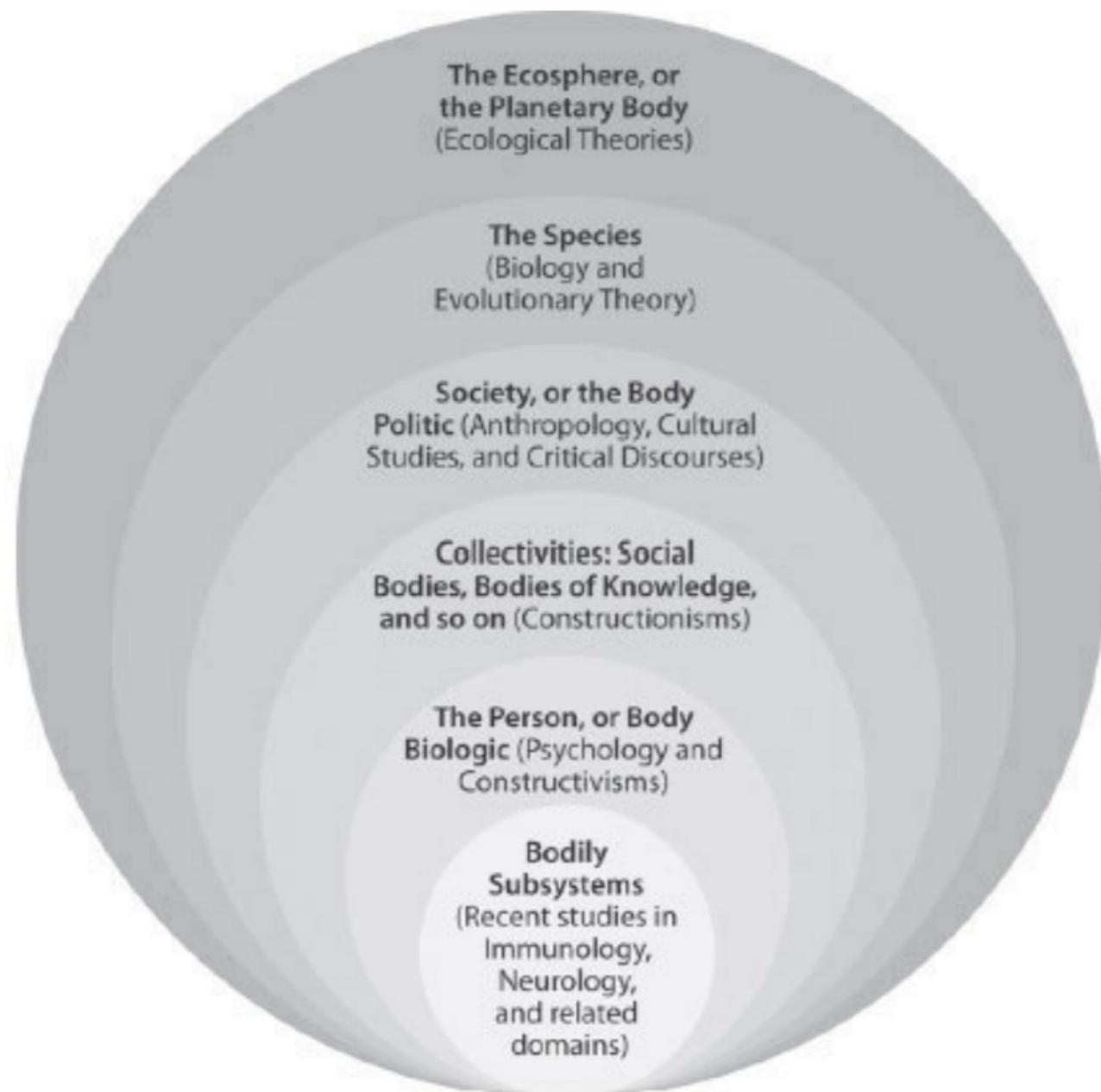
**Which, if any, of the traces of heart activity is indicative of a healthy heart? (The answer is discussed to the right.)**

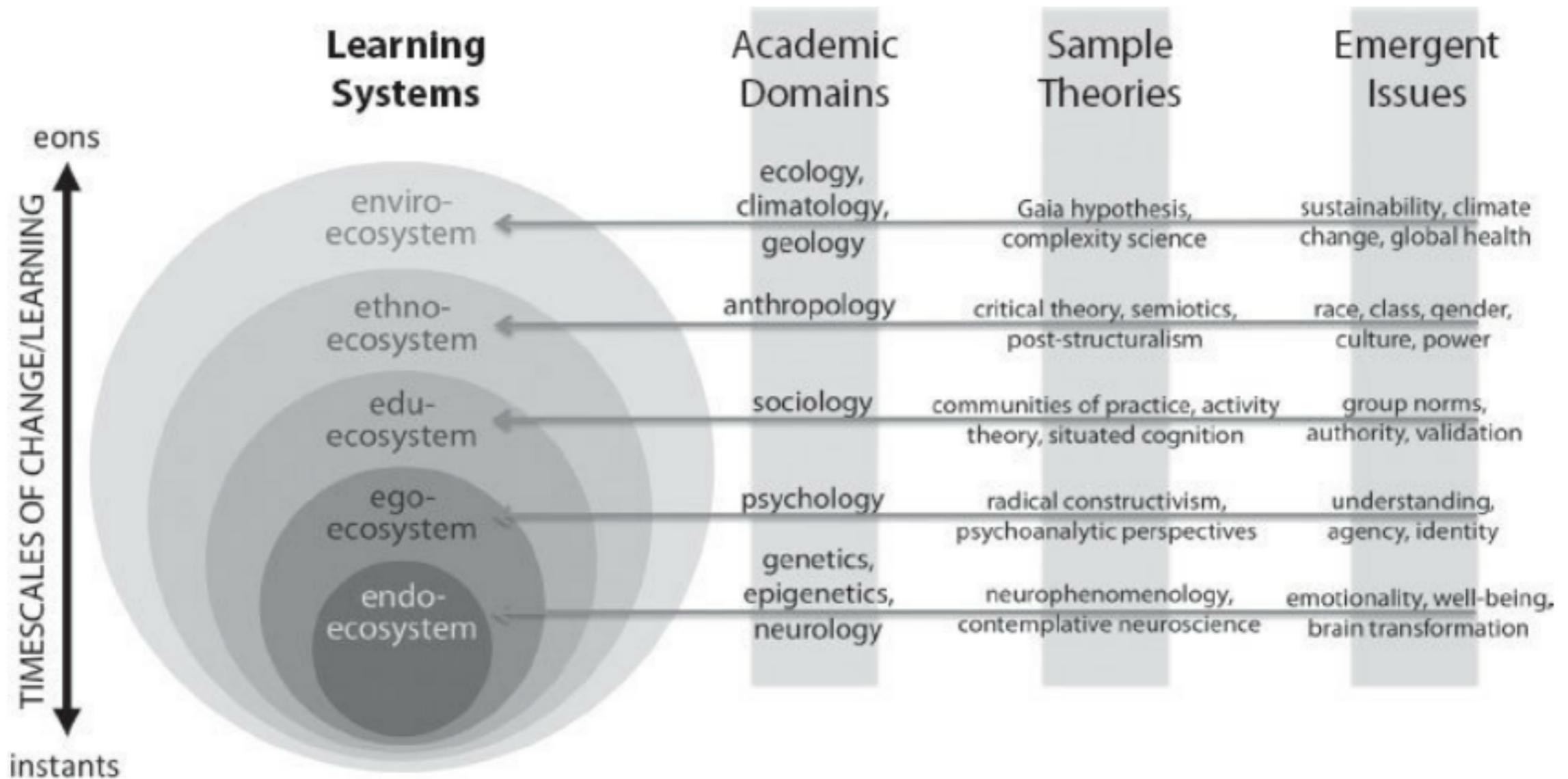


***Emergent* is a word that was used very little until the middle of the last century, but has surged in popularity since. Among complexity thinkers, it is used in specific reference to the appearance of a whole that exceeds the parts.**



***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.**





# Human beings and the world: a problem of beliefs

- 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

# 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)

# Complexity Thinking

- 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 than the sum of its parts

# Complexity: some definitions

1. Complexity is comparative dynamics
2. Complexity is the study of emergent transphenomena
3. Complexity refers to a category of 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

## 2. Complexity is the study of emergent transphenomena

- 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.

## 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](https://www.youtube.com/watch?v=XS0i0b_K5_E)

### 3. Complexity: phenomena with specific qualities

- Complex forms can :
- Self-organize
- Self-determine
- Work off balance
- Be organized in decentralized networks
- Scale independent

## 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).

## 5. Complexity: the study of learning systems

- Complex systems are learners.
- They adapt with and in other learning systems
- They can be in *conversation* with others

# Subpersonal and superpersonal level

- The study 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

# To conclude

- The role of education is linked with:
- The participatory attitude (to respect the existence in broad sense)
- Coscientization (to adopt an ecological mindfulness)
- Emotions, learning through experience, service, inclusivity ...
- Global citizenship (connect with ethical sensitivity)

# Systemic sustainability education

- Is an education that is realized when *diversities* are brought into *conversation*.
- It is all about *engaging!*
- *It is oriented to the possibilities of what might be*