Universal design for learning

* **Engagement** (the why of learning): recruiting interest, sustaining effort and persistence, and self-regulation.
  + Spark motivation and enthusiasm for learning
  + Connect authentic personal experiences to the learning environment
  + Context dependent
    - New and spontaneous vs. routine
    - Alone vs in peers
  + Variability 🡪 need for constant presence of multiple options
  + Joy and play
* **Representation** (the what of learning): perception, language and symbols, and comprehension.
* **Action & Expression** (the how of learning): physical action, expression and communication, and executive function.

**How learning in the brain happens**

* change in communication within and between brain networks
* UDL networks
  + Affective – motivation and participation
  + Recognition networks – perception of information and surrounding environment and transformation there of into knowedge
  + Strategic network – plan and organization of strategies and skills
* Network neuroscience
  + network map of the brain where brain regions synchronize their activity
  + ass1  brain is organized into large-scale functional networks that can be consistently identified across participants and time
    - functional networks might interact to support a wide range of behavioral and cognitive functions
* Network neuroscience and psychological theories
  + Affective theory ([Panksepp, 1998](https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2018.00895/full" \l "B40))
    - 7 emotion- related circuits
    - Innate
    - Amygdala and limbic system
    - Fast to generate
    - Quick responses
  + reward sensitivity theory ([Gilson et al., 2018](https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2018.00895/full" \l "B20))
  + theory of constructed emotions ([Barrett, 2017](https://www.frontiersin.org/journals/neuroscience/articles/10.3389/fnins.2018.00895/full" \l "B2))
    - brain uses its past experience to engage in predictive modeling of the environment
* learning and the brain
  + when learning a new concept 🡪 new connection in the brain are formed or the one relevant for learning are strengthened

Networks

* affective
  + limbic system
  + fast responses to stimuli
  + fight or flight
  + beginning of memory formation – hippocampus
    - learning for different tasks, spatial, motor effective, etc.
  + action and reaction
  + planning, motivation
  + research
    - the power of affect (as a motivator)
  + high inter personal variability
  + effects of environment and nurture are huge
  + emotional and motivational significance
* recognition
  + perception of information from the environment and transformation into usable knowledge
  + incorporates
    - sensory, motor and visual systems
    - constant communication with the limbic systems
  + long-term storage of information
  + formation of connections that can be easily primed
  + recognition of environmental patters
  + highly specialized depending on stimulus type
  + distributed specialization and parallel processing
    - math task involve reading as well
    - a tasks can be accomplished in many different ways, engaging the systems that are individually advantageous
* strategic
  + !! the motor cortex (as fro the image in the book and website) is in the recognition and not strategic network
  + plan, organize, initiate actions
  + more superior, evolutionary bigger in humans

Notes Verji

* to successfully apply the UDL, one needs to familiarize themselves very well with the overall characteristics of the group they are teaching
  + studies of how their brains might be different
  + recognize patterns in single students that are maybe predictive of other behavior

Always remember

Before we describe each of the three networks we offer an impor-

tant caveat: any division of the brain is useful only as a model and a

lens through which to study phenomena. In reality, networks always

work together as one overall organism. We separate the parts only to

try to understand more clearly how each contributes to learning overall

and to understand learner variability. By dividing types of networks

and studying the functions for which they are specialized, we can gain

insights about how students learn and how they vary.