

Educational Technology



Pedagogy and Learning Theories for Online Learning

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Pedagogy and learning based on ICTs – Contents



- Issues about the influence of media on learning
- Learning theories and e-learning
 - *Behaviorism*
 - *Cognitivism*
 - *Constructivism*
 - *Connectivism*

**Tell me, I forget. Show me, I remember. Involve me, I understand.
(Chinese proverb)**

Material is taken from:

- A Guidebook of Principles, Procedures and Practices, Som Naidu, 2006

-The Theory and Practice of Online Learning, Terry Anderson, AU Press, 2008

Impacts of ICTs on learning

- Learning must use robust instructional design principles.
 - *Hence, the development of effective online courses, eLearning activities and digital educational material should be based on proven and wide-accepted learning theories.*
- It has been recognized that online learning supports flexibility of access, from anywhere and usually anytime.
- There is a longstanding debate about whether the use of ICT can influence learning.
 - *Clark R.E. (1983), claims that ICT are merely vehicles that deliver instruction, and do not themselves influence student achievement. Thus, the instructional strategy, and not the technology, influences the quality of learning.*
 - *Kozma, R. B. (2001), on the other hand, argues that particular attributes of technology is needed to bring real-life models and simulations to the learner; thus, ICT does influence learning.*



Learning capabilities of ICTs (1)

- It is generally accepted that by using ICT in educational process, students gain significant learning benefits, as opposed to conventional instruction.
- Clever and interactive learning material can serve to motivate learner's interest.
- Certain content (such as those containing video) has attributes that are especially valuable for capturing authentic contexts and situations from the real world and represent real-world scenarios.
- Also, ICT can be used to develop learning environments that could serve particular educational strategies.
- In fact, ICT afford a wide range and variety of opportunities to re-think and re-engineer the nature of teaching and learning practices.



Learning capabilities of ICTs (2)

- eLearning seems to be very effective in developing learner and learning-centered educational environments.
- It has been recognized that specialized delivery educational ICT can provide efficient and timely access to learning material,
 - *but these learning material must use sound instructional design principles.*
- Skillful integration of learning material and teaching methods is critical for the optimization of learning.
- This integration can be achieved through learning theories and more specifically through various pedagogical designs based on these theories.
- ICT used, along with instructional methods would seem to have an influence on learning.



Conventional learning theories and eLearning

- In conventional education instructors must explicitly know the principles of learning and how students learn.
 - *This is much more important for online learning, where instructors and learners could co-exist separated (in terms of time or space).*

- There are many learning theories for conventional education, but no one is used exclusively to design online learning courses, activities and materials:
 - *As there is no single learning theory to follow, eLearning educators (as the conventional ones) use a combination of theories to develop online instructional activities.*
 - *Usually, past learning theories have been adapted to address new and changing eLearning contexts. So, eLearning educators should be able to employ existing learning theories adapted for the digital age.*

- To select the most appropriate instructional strategies, the online educator must know the different approaches to learning.



1st Flash Activity



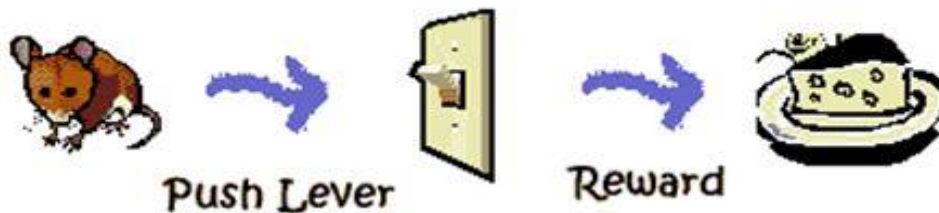
1st Flash Activity

Κατά τη γνώμη σας τι είναι μια θεωρία μάθησης και αναφέρατε κάποιες θεωρίες μάθησης που γνωρίζετε.



Learning theories - Behaviorism

- Behaviorism is a theory of learning based upon the idea that all behaviors (thus thinking) are acquired through conditioning that based on interaction with the environment.
- According to behaviorism, learning is a change in observable behavior caused by external stimuli in the environment (Skinner^(*), 1974). Observable behavior indicates whether the learner has learned something (or hasn't).
- This school of thought suggests that only observable and measurable behaviors should be studied (unlike introspective psychology), since internal states such as cognitions, emotions and moods are too subjective.
- Learners should be told the explicit outcomes of the learning and they must be tested to determine whether they have achieved (or haven't) the learning outcome. Learners must be provided with feedback.



<http://epltt.coe.uga.edu/>

(*) https://books.google.gr/books/about/About_Behaviorism.html?id=dsPV3S1wmfEC&redir_esc=y

Views of Behaviorism

- In behaviorism, knowledge is interpreted as a collection of behaviors (“knowledge is action” -Skinner). There is no mention of cognitive processes.
- It treats humans as a black box: input & output are measurable, but its unknown what happens inside the box.
- Essentially, the transmission of knowledge from teacher to learner is the appropriate response to a certain stimulus.
- Behaviorist teaching methods have proven most successful in areas where there is a “correct” response or easily memorized material. They based on:
 - *“skill and drill” exercises to provide the consistent repetition necessary for effective reinforcement of response patterns*
 - *question (stimulus) and answer (response) frameworks in which questions are of gradually increasing difficulty*
 - *guided practice and*
 - *regular reviews of material.*



Behaviorism - Strengths and Weaknesses

- Weakness - the learners may find themselves in a situation where the stimulus for the correct response does not occur, therefore the learner cannot respond.
 - *A worker who has been conditioned to respond to a certain cue at work stops production when an anomaly occurs because they do not understand the system.*
- Strength - the learner is focused on a clear goal and can respond automatically to the cues of that goal.
 - *W.W.II pilots were conditioned to react to silhouettes of enemy planes, a response which one would hope became automatic.*

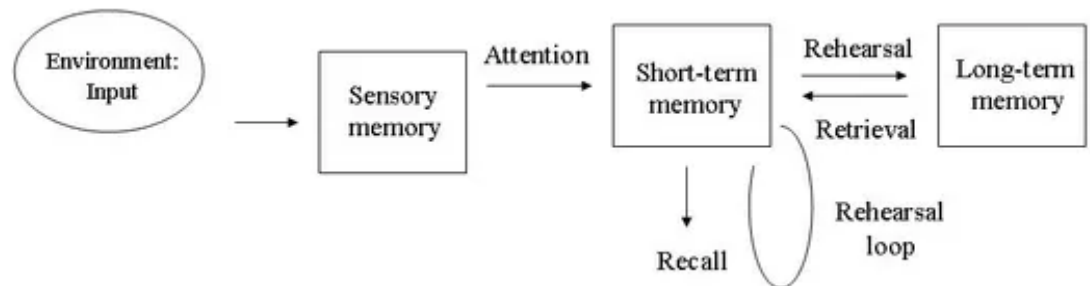


<https://www.aliem.com>

(Schuman, 1996)

Learning theories - Cognitivist school of learning

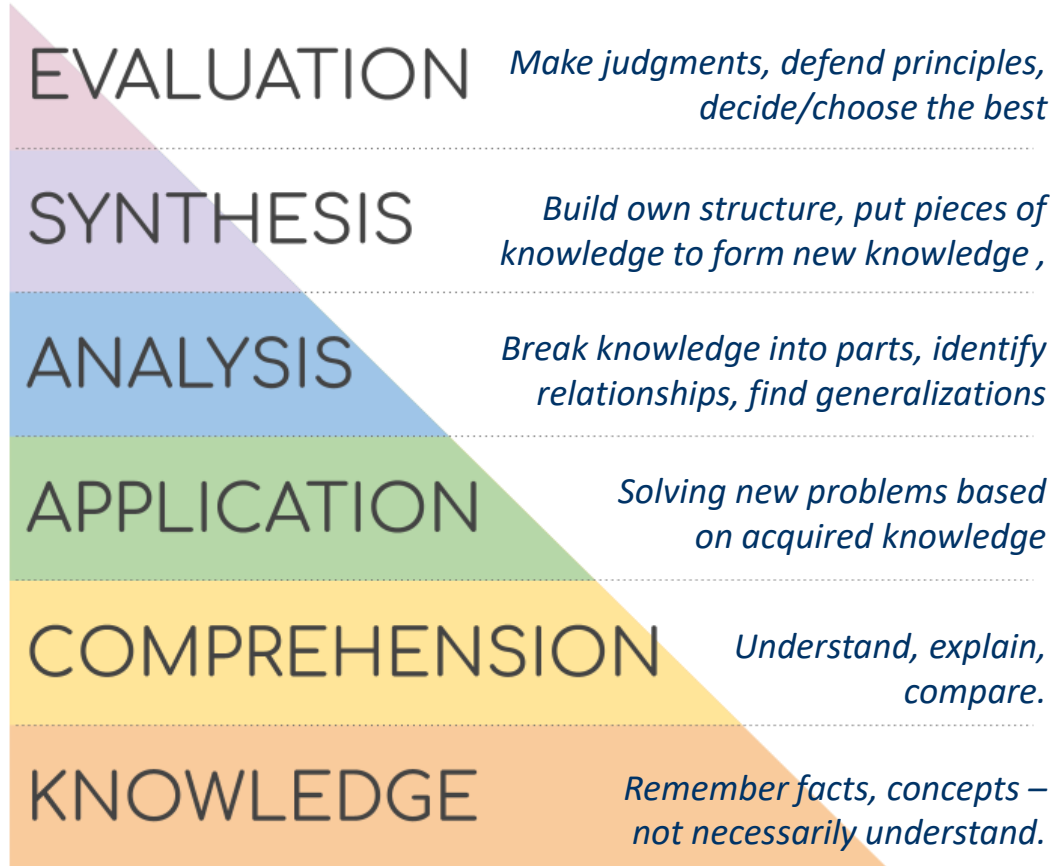
- Cognitive theorists claim that learning involves the use of memory, motivation, and thinking.
- So learning is an internal process and the amount learned depends on the processing capacity and depth, the amount of effort and the previous knowledge of the learner.
- Unlike behaviorism, it is believed that learners are motivated intrinsically.
- Pure cognitive learning theory looks at learning from an information processing point of view.
 - *The learner uses different types of memory during learning.*
 - *After the information is processed in working memory, it is stored in long-term memory.*



<https://www.simplypsychology.org>



Bloom's taxonomy

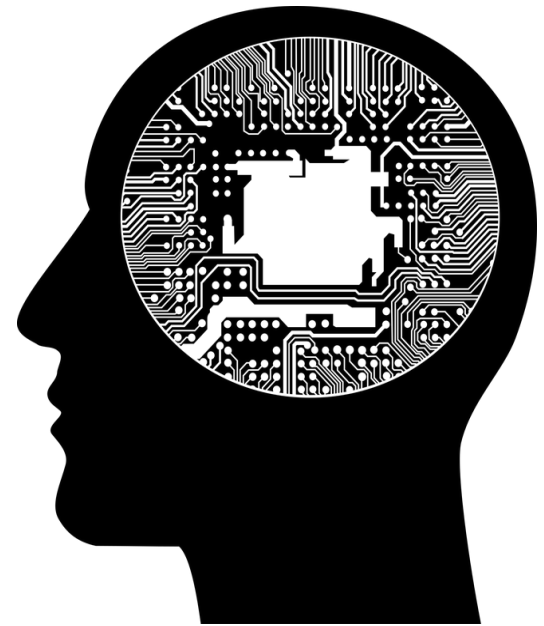


<https://en.wikipedia.org/>

- Cognitivism in education are based on Bloom's taxonomies of learning objectives.
- Three important domains of learning:
 - *cognitive (thinking)*
 - *affective (feeling)*
 - *psycho-motor (doing).*
- There is a hierarchy of learning (1956):
 - *from recalling knowledge to evaluation*

Cognitivism - Strengths and Weaknesses

- Weakness - the learner learns a way to accomplish a task, but it may not be the best way, or suited to the learner or the situation.
 - *For example, logging onto the internet on one computer may not be the same as logging in on another computer.*
- Strength - the goal is to train learners to do a task the same way to enable consistency.
 - *Logging onto (and off) of a workplace computer is the same for all employees; it may be important do an exact routine to avoid problems.*



<https://improvingteaching.co.uk>

(Schuman, 1996)



Cognitivism: constructing knowledge

- Cognitivism is a learning theory that pays attention more to what happens inside learner's head by focusing on mental processes rather than observable behavior.
- Piaget (1896-1980), first tried to explain child's mental growth by identifying four stages cognitive development of children.
- Learning is relative to learner's stage of cognitive development and understanding the learner's existing intellectual framework is central to understanding the learning process.
- Children are not just limited to receiving knowledge (from parents/teachers), but they actively constructed their own knowledge based on their existing cognitive structures.
 - *Learners don't get ideas. They create (construct) ideas.*
- Piaget's work provides the foundation on which constructionist theories are based.



Learning theory: Constructivism

- Constructivism emphasizes the experience and role of the individual in developing concepts.
- Consciousness, free will and social influences are playing important role on learning.
- This learning theory tries to explain how learners learn by constructing knowledge for themselves from the learning experience. Learners:
 - *interpret the information and the world according to their personal reality.*
 - *learn by observation, processing, and interpretation, and then personalize the information into personal knowledge.*
- The learner is the center of the learning (learner - centered), with the instructor playing an advising and facilitating role.



<https://www.merlot.org>

Views of Constructivism

- According to constructivists, knowledge is actively constructed by learners and that any account of knowledge makes essential references to cognitive structures.
 - *each learner interprets experiences and information in the light of their extant knowledge, their stage of cognitive development, their cultural background, their personal history, and so forth.*
- Learning is presented as a process of active discovery. The role of the teacher is to facilitate discovery by providing the necessary resources and by guiding learners.
- Successful learning requires a major personal investment on the part of the learners as they must face up to the limitations of their existing knowledge and accept the need to modify or abandon existing beliefs.



Constructivism - Strengths and Weaknesses

- Weakness - in a situation where conformity is essential, divergent thinking and action may cause problems.
 - *Imagine the fun Revenue department would have, if every person decided to report their taxes in their own way - although, there probably are some very "constructive" approaches used within the system we have.*
- Strength - because the learner is able to interpret multiple realities, the learner is better able to deal with real life situations.
 - *If a learner can problem solve, they may better apply their existing knowledge to a novel situation.*



2nd Flash Activity

Με βάση τις παραπάνω θεωρίες μάθησης που αναπτύχθηκαν ποια θα πρέπει να είναι η σχέση educational material and learning theories?

Ποιες είναι οι βασικές strategies to teach “what”, “how” and “why” according to the basic learning theories?

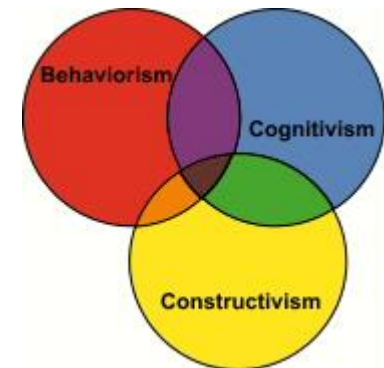
Educational material and learning theories

- Behaviorism: The learning materials must be sequenced appropriately to promote learning.
 - *The sequencing could take the form of simple to complex, known to unknown, and knowledge to application.*
- Cognitivism: Since working memory (short-term) has limited capacity, information should be organized or chunked in pieces of appropriate size to facilitate processing.
- Constructivism: Learners actively collaborating with the medium to construct knowledge.
 - *So, learners should interact with instructor, with other learners and with educational material (which must have this capability).*

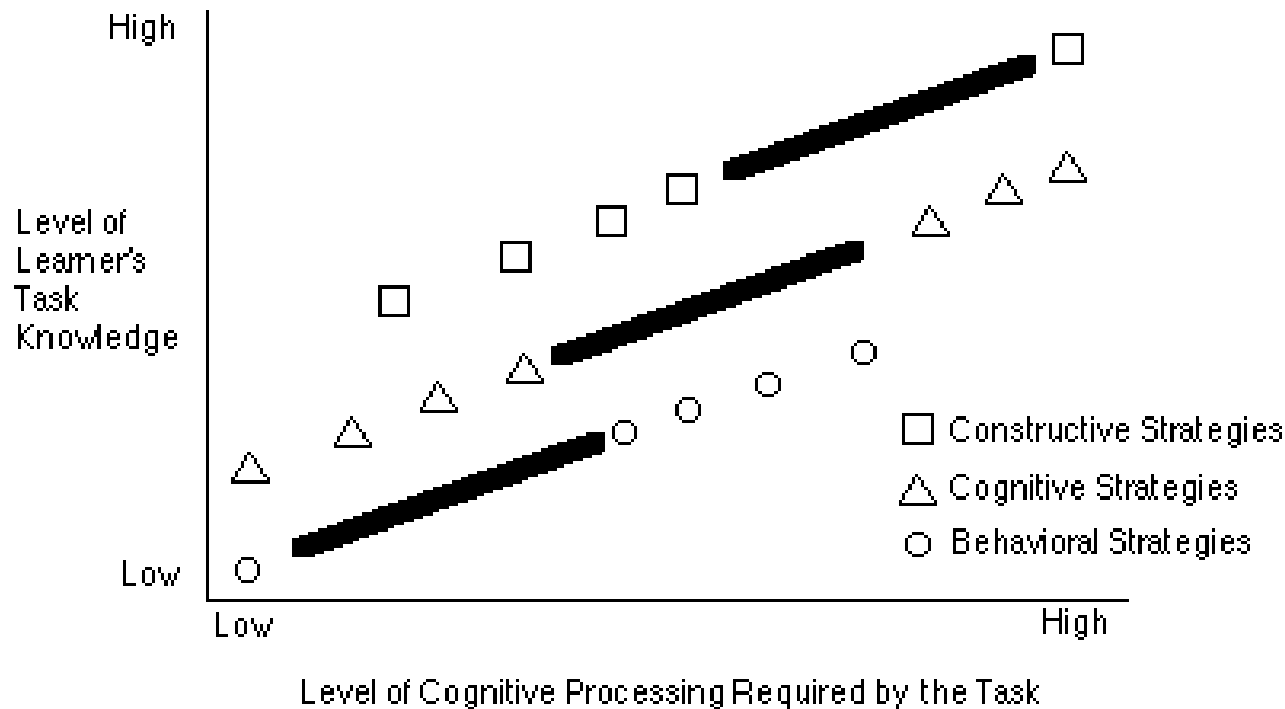


Strategies to teach “what”, “how” and “why”

- Behaviorists’ strategies can be used to teach the **what** (facts).
- Cognitive strategies can be used to teach the **how** (processes and principles).
- Constructivist strategies can be used to teach the **why** (higher-level thinking that promotes discovery of knowledge, personal meaning, and situated and contextual learning).



Learning theories – instructional design perspectives



Comparison of the associated instructional strategies of the behavioral, cognitive, and constructivist viewpoints based on the learner's level of task knowledge and the level of cognitive processing required by the task.

From Ertmer and Newby: *Behaviorism, Cognitivism, Constructivism: Comparing Critical Features from an Instructional Design Perspective*

Conventional learning theories briefly

- Behaviorism: Based on observable changes in behavior. Behaviorism focuses on a new behavioral pattern being repeated until it becomes automatic.
- Cognitivism: Based on the thought process behind the behavior. Changes in behavior are observed and used as indicators as to what is happening inside the learner's mind.
- Constructivism: Based on the premise that we all construct our own perspective of the world, through individual experiences and schema. Constructivism focuses on preparing the learner to problem solve in ambiguous situations.



(Schuman, 1996)

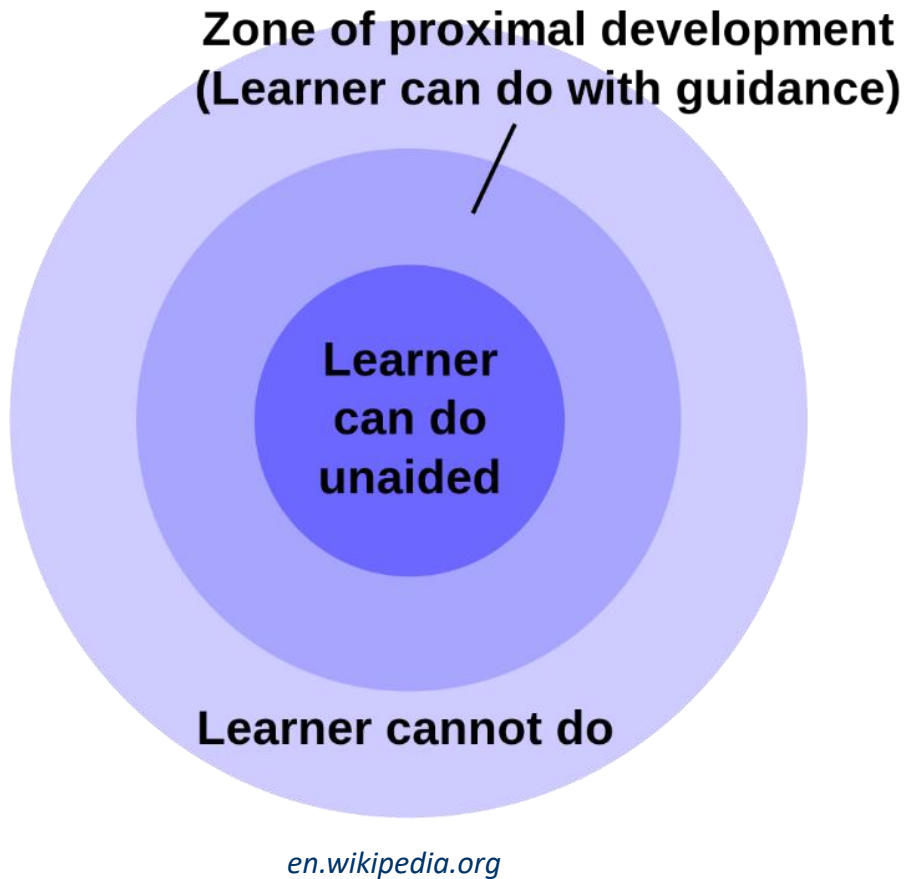
Social constructivism (one more learning theory!)

- Working on constructivism's concepts that are based on experience, Vygotsky (1968) introduced the idea of social constructivism:
 - *learning did not simply comprise the assimilation and accommodation of new knowledge by learners, but all cognitive functions originate in social interactions*
- Social constructivism, emphasizes the collaborative nature of learning:
 - *learning is not an individual exercise but is developed through social interaction and couched in language.*
- Highlights the social and dialogic aspects of learning by emphasizing the interaction between educators and learners.
- Vygotsky's theory of social learning has been expanded upon by numerous later theorists and researcher.

<https://www.merlot.org>



The Zone of Proximal Development (ZPD)



- ZPD defines the distance between what a learner can do with help, what they can do unaided, and what they cannot do.
- Bruner (1978) further developed the concept of “scaffolding”.
- Scaffolding is a process through which a teacher or a more competent peer helps a student in their ZPD.

Overview of Learning Theories

| | <u>Behaviorism</u> | <u>Cognitive Constructivism</u> | <u>Social Constructivism</u> |
|----------------------------------|---|---|--|
| View of knowledge | Knowledge is a repertoire of behavioral responses to environmental stimuli. | Knowledge systems of cognitive structures are actively constructed by learners based on pre-existing cognitive structures. | Knowledge is constructed within social contexts through interactions with a knowledge community. |
| View of learning | Passive absorption of a predefined body of knowledge by the learner. Promoted by repetition and positive reinforcement. | Active assimilation and accommodation of new information to existing cognitive structures. Discovery by learners is emphasized. | Integration of students into a knowledge community. Collaborative assimilation and accommodation of new information. |
| View of motivation | Extrinsic, involving positive and negative reinforcement. | Intrinsic; learners set their own goals and motivate themselves to learn. | Intrinsic and extrinsic. Learning goals and motives are determined both by learners and extrinsic rewards provided by the knowledge community. |
| Implications for teaching | Correct behavioral responses are transmitted by the teacher and absorbed by the students. | The teacher facilitates learning by providing an environment that promotes discovery and assimilation/accommodation. | Collaborative learning is facilitated and guided by the teacher. Group work is encouraged |



Connectivism (yet another learning theory!)

- Unlike the previous broad learning theories, connectivism is directly impacted through technology.
- Connectivism was proposed by George Siemens and Stephen Downes in 2004–2005, and it seems to be the first Internet-native learning theory.
- According to connectivism, learning is based on the premise that knowledge exists in the networked world rather than in learner's mind.
- So appropriate use of the Internet is an ideal learning strategy, as it is expanding education into a global classroom.
- It is apparent that a course based on connectivism learning, would feel very different for learners than a conventional course.
- Connectivism aims to prepare learners to function in the digital and networked age.



<http://here2there.ca>

Connectivism (yet another learning theory!)

- Key to the connectivist approach is the belief that knowledge is distributed in a network, and learning is a chaotic process.
- Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories.
- In the rapidly changed information society environments, the learners have to unlearn what they have learned in the past and learn how to learn and evaluate new information.
- Learner must have the ability to identify important information from unimportant information and to recognize when new information alters the landscape. Decision-making is itself a learning process.
- Connectivism aims to prepare learners to function in the digital and networked age.



<http://here2there.ca>

3rd Flash Activity

Ποια είναι κατά τη γνώμη σας η καταλληλότερη θεωρία μάθησης για το eLearning και γιατί.

Which learning theory for eLearning?

- The design of eLearning course and e-materials could include principles from all three schools of thought (after all, ideas and principles overlaps exist between learning theories).
- There is a shift toward constructive approaches, as learner-centered teaching is more appropriate for eLearning by exploiting ICT's capabilities.
- Forms of learner-centered pedagogical designs are **situated learning** (learning takes place within the context of realistic educational settings) and **learning by doing** teaching environments.
- Scenario/goal/problem/role-play/case-based learning are well-known types of situated learning and learning by doing.
- ICT can afford us opportunities to capture and/or represent real-world scenarios for use by learners.

