An Exploration of Learning Theories

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Paradigm: Behaviorism

- Thorndike (1913), Pavlov (1927), and Skinner (1974)
- Observable behavior indicates whether or not the learner has learned something

Paradigm: Cognitivism

- (Craik & Lockhart, 1972; Craik & Tulving, 1975; Ausubel, 1974)
- Learning involves the use of memory, motivation, thinking, and reflection.

Paradigm: Constructivism

- (Cooper, 1993; Wilson, 1997, Bruner, 1996)
- Students actively construct or create their own subjective representations of objective reality.

You Explore:
Which Theories Do You Prefer?

- http://www.learning-theories.com/
- http://web.cortland.edu/frieda/ID/IDdatabase.html
- http://www.sil.org/lingualinks/literacy/ImplementALiteracyProgram/LearningTheories.htm

Behavior Theories & Technology

Classical Conditioning (Pavlov) Connectionism (Thordike 1913) law of effect & law of exercise Operant Conditioning (Skinner 1953) reinforcements & punishments schedule of reinforcement	Mastery Learning Model (Carroll 1963)	Patrick Suppes (1960s) practice and drill Presentation Structured Practice Guided Practice	CCC (Computer Curriculum Corporation, now Successmaker) Tutorials Math Blaster NASA's Virtual Skies

Gillani, B. B. (2003). *Learning theories and the design of e-learning environments*. Lanham, MD: University Press of America.

Cognitive Theories & Tech

Cognitive Development (Piaget 1952) reconstruct knowledge & active reflection schema, assimilation, accommodation, equilibrium Stages of Development (Piaget 1954) sensorimotor – birth-2 pre-operational – 2-7 yrs concrete operation – 7 to adolescence formal operation – adolescence to adult Ausubel (1968) advance organizers Bruner (1966) scaffolding Flavell (1983) combinational reasoning propositional reasoning hypothetical-deductive reasoning	Constructivism Movement based on Piaget's concept that individuals construct their knowledge of the world Inquiry-Training (Suchmann 1962) Discovery Learning (Bruner 1961)	Seymour Papert (1960s) LOGO project MicroWorlds Robert Davis (1960s) Plato project HyperCard HyperStudio Director, Authorware Duffy & Jonassen (1991) Technology is the way students construct their cognitive representation of the world.	Exploratorium Institute for Inquiry The Big6 Eisenberg and Berkowitz Online inquiry training with NASA's Astro-Venture Discovery Learning and Simulation: SimCity, SimEarth and NASA's Solar System Simulator (concept vs procedural simulations)

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Social Theories & Technology

Sociocognitive Theory (Vygotsky 1978, 1992) zone of proximal development internalization of external activities external and internal speech	Social Inquiry Teaching Model (Gillani, 1994) Cognitive Apprenticeship (Collins, Brown & Newman 1989) Situated Cognition (Collins, Brown & Newman 1989)		NASA's Planetary Flight Socio-cognitive theory in online learning for 2nd language adult learners

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Psychological Theories & Tech

Systems Thinking (Senge 1990) Theory/Stages of Psychological Development (Erikson 1950) O'Keefe and Nadal (1978) Human Memory and Integrated Structure of Knowledge	Kovalik (1994) teaching models resembling the philosophy of systems theory Thematic Interdisciplinary Teaching Model Problem Based Learning (Finkle and Torp 1995)		The Great Ocean Rescue by Tom Snyder Center for Problem Based Learning Jason Project NASA SCIence Files

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Marzano / Classroom Instruction That Works

- Instructional strategies that have a high probability of enhancing student achievement for all students in all subjects at all grade levels
- Meta-analysis of research
- Effect sizes for .59 to 1.61
- Percentile gain from 22 to 45
- Caution: no instructional strategy works equally well in all situations

Marzano, R. J., Pickering, D., & Pollock, J. E. (2001). *Classroom instruction that works : research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.

What will students learn?

Setting Objectives	1. Setting instructional goals narrows what students' focus on. 2. Teachers should encourage students to personalize the learning goals the teacher has identified for them. 3. Instructional goals should not be too specific.	1. Set learning objectives that are specific but flexible. 2. Allow students flexibility in personalizing the learning objectives or goals. 3. Communicate the learning objectives or goals to students and parents. 4. Contract with students to attain specific learning objectives or goals.	Humanism – focus on goals	Keller - Attention, Relevance, Confidence, Satisfaction (ARCS) Model of Motivational Design…. Particularly Relevance, Learner Control, Choice

Pitler, H., Hubbell, E. R., Kuhn, M., & Malenoski, K. (2007). *Using technology with classroom instruction that works*. Alexandria, VA: Association for Supervision and Curriculum Development.

Which strategies provide evidence of student learning?

Providing Feedback	1. Feedback should be corrective in nature. 2. Feedback should be timely. 3. Feedback should be specific to a criterion. 4. Students can effectively provide some of their own feedback.	1. Use criterion-referenced feedback. 2. Focus feedback on specific types of knowledge. 3. Use student-led feedback.	Humanism, focus on motivation	Keller - Attention, Relevance, Confidence, Satisfaction (ARCS) Model of Motivational Design…. Particularly Feedback& Satisfaction

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Which strategies provide evidence of student learning?

Providing Recognition	1. Rewards do not necessarily have a negative effect on intrinsic motivation. 2. Reward is most effective when it is contingent on the attainment of some standard of performance. 3. Abstract symbolic recognition is more effective than tangible rewards.	1. Personalize recognition. 2. Use the Pause, Prompt, and Praise strategy. 3. Use concrete symbols of recognition.	Humanism, focus on motivation	Keller - Attention, Relevance, Confidence, Satisfaction (ARCS) Model of Motivational Design…. Particularly Satisfaction

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Which strategies will help students acquire and integrate learning?

Cues, Questions, and Advance Organizers	1. Cues, questions, and advance organizers should focus on what is important rather than what is unusual. 2. "Higher level" questions and advance organizers produce deeper learning than "lower-level" ones. 3. Advance organizers are most useful with information that is not well organized. 4. Different types of advance organizers produce different results. 5. Waiting briefly before accepting responses from students has the effect of increasing the depth of students' answers. 6. Questions are effective learning tools even when asked before a learning experience.	1. Use expository advance organizers. 2. Use narrative advance organizers. 3. Teach students skimming as a form of advance organizer. 4. Teach students how to use graphic advance organizers. 5. Use explicit cues. 6. Ask questions that elicit inferences. 7. Ask analytic questions.	Cognitivism	Schema theory of learning (Anderson, 1977) Advanced Organizers (Subsumption Theory) (Ausubel 1960)

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Nonlinguistic Representation	1. A variety of produce nonlinguistic representation. 2. The purpose of nonlinguistic representation is to elaborate on knowledge.	1. Use graphic organizers to represent knowledge. 2. Have students create physical models of the knowledge. 3. Have students generate mental pictures of the knowledge they are learning. 4. Use pictures or pictographs to represent knowledge. 5. Have students engage in kinesthetic activities representing the knowledge.	Constructivism	Constructivism (Bruner) – Students actively construct or create their own subjective representations of objective reality.

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Summarizing and Note Taking	1. To effectively summarize, students must delete some information, substitute some information, and keep some information. 2. To effectively delete, substitute, and keep information, students must analyze the information at a fairly deep level. 3. Being aware of the explicit structure of information is an aid to summarizing information. 1. Teach students the rule-based summarizing strategy. 2. Use summary frames. 3. Teach students the reciprocal teaching strategy.	1. Verbatim note taking is perhaps the least effective way to take notes. 2. Notes should be considered a work in progress. 3. Notes should be used as study guides for tests. 4. The more notes that are taken, the better. 1. Give students teacher-prepared notes. 2. Teach students a variety of note-taking formats. 3. Use combination notes.	Constructivism	Constructivist Learning Environments (Jonassen). Scaffolding learning & cognitive tools.

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Cooperative Learning	1. Organizing groups based on ability levels should be done sparingly. 2. Cooperative learning groups should be rather small in size. 3. Cooperative learning should be used consistently and systematically but should not be overused.	1. Use a variety of criteria to group students. 2. Use informal, formal, and base groups. 3. Keep the groups to a manageable size. 4. Combine cooperative learning with other classroom structures.	Construct ivism	Social constructivism (Vygotsky)

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Reinforcing Effort	1. Not all students realize the importance of believing in effort. 2. Students can learn to operate from a belief that effort pays off even if they do not initially have this belief.	1. Explicitly teach students about the importance of effort. 2. Have students keep track of their effort and achievement.	Cognitivism	Self-theories (Dweck, 1999). Incremental view. "intelligence is malleable and can be increased through effort" Attribution Theory (Weiner). Locus of control – working to teach students to have internal locus of control.

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Which strategies will help students practice, review, and apply learning?

Identifying Similarities And Differences	1. Presenting students with explicit guidance in identifying similarities and differences enhances their understanding of and ability to use knowledge. 2. Asking students to independently identify similarities and differences enhances their understanding of and ability to use knowledge. 3. Representing similarities and differences in graphic or symbolic form enhances students' understanding of and ability to use knowledge. 4. Identification of similarities and differences can be accomplished in a variety of ways and is a highly robust activity.	1. Teach students to use comparing, classifying, metaphors and analogies when they identify similarities and differences. 2. Give students a model of the steps for engaging in the process. 3. Use a familiar context to teach students these steps. 4. Have students use graphic organizers as a visual tool to represent the similarities and differences. 5. Guide students as they engage in this process. Gradually give less structure and less guidance.	Constructivism	(Bruner) The learner is an information constructor. People actively construct or create their own subjective representations of objective reality. New information is linked to to prior knowledge, thus mental representations are subjective.

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Homework And Practice	1. The amount of homework assigned to students should be different from elementary to high school. 2. Parental involvement in doing homework should be kept to a minimum. 3. The purpose of homework should be identified and articulated. 4. If homework is assigned, it should be commented upon. 1. Mastering a skill or process requires a fair amount of focused practice. 2. While practicing, students should adapt and shape what they have learned.	1. Establish and communicate a homework policy. 2. Design homework assignments that clearly articulate purpose and outcome. 3. Vary approaches to providing feedback. 1. Ask students to chart their speed and accuracy. 2. Design practice assignments that focus on specific elements of a complex skill or process. 3. Plan time for students to increase their conceptual understanding of skills or processes.	Associated Learning Theory	Merrill's First Principles of Instruction. Practice, guided practice, knowledge applied by the learner.

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Generating and Testing Hypotheses	1. The generating and testing of hypotheses can be approached in an inductive or deductive manner. 2. Teachers should ask students to clearly explain their hypotheses and their conclusions.	1. Make sure that students can explain their hypotheses and conclusions. 2. Use a variety of structured tasks to guide students through generating and testing hypotheses.	Constructivism Humanism	Discovery Learning (Bruner) - learner draws past experience and existing knowledge; interact with the world by exploring and manipulating objects, wrestling with questions and controversies, or performing experiments; inquiry based constructivism Problem based learning for one of the structured tasks Kolb (1984) learning cycles: active experimentation; also observe, think, plan cycle

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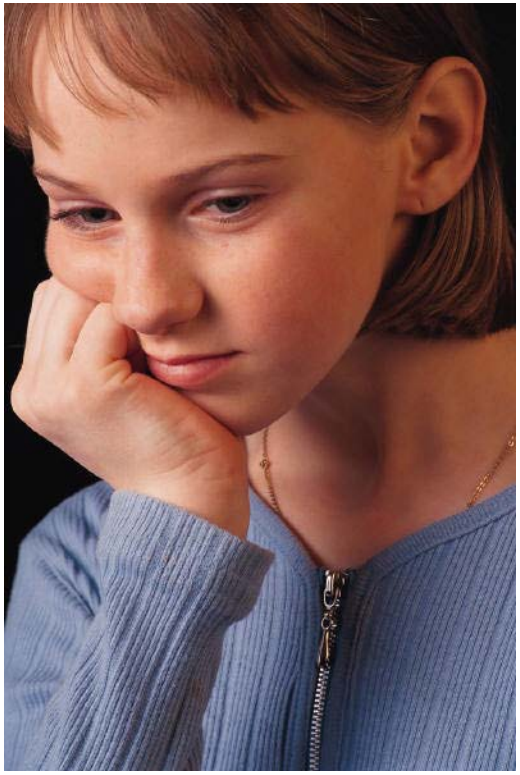
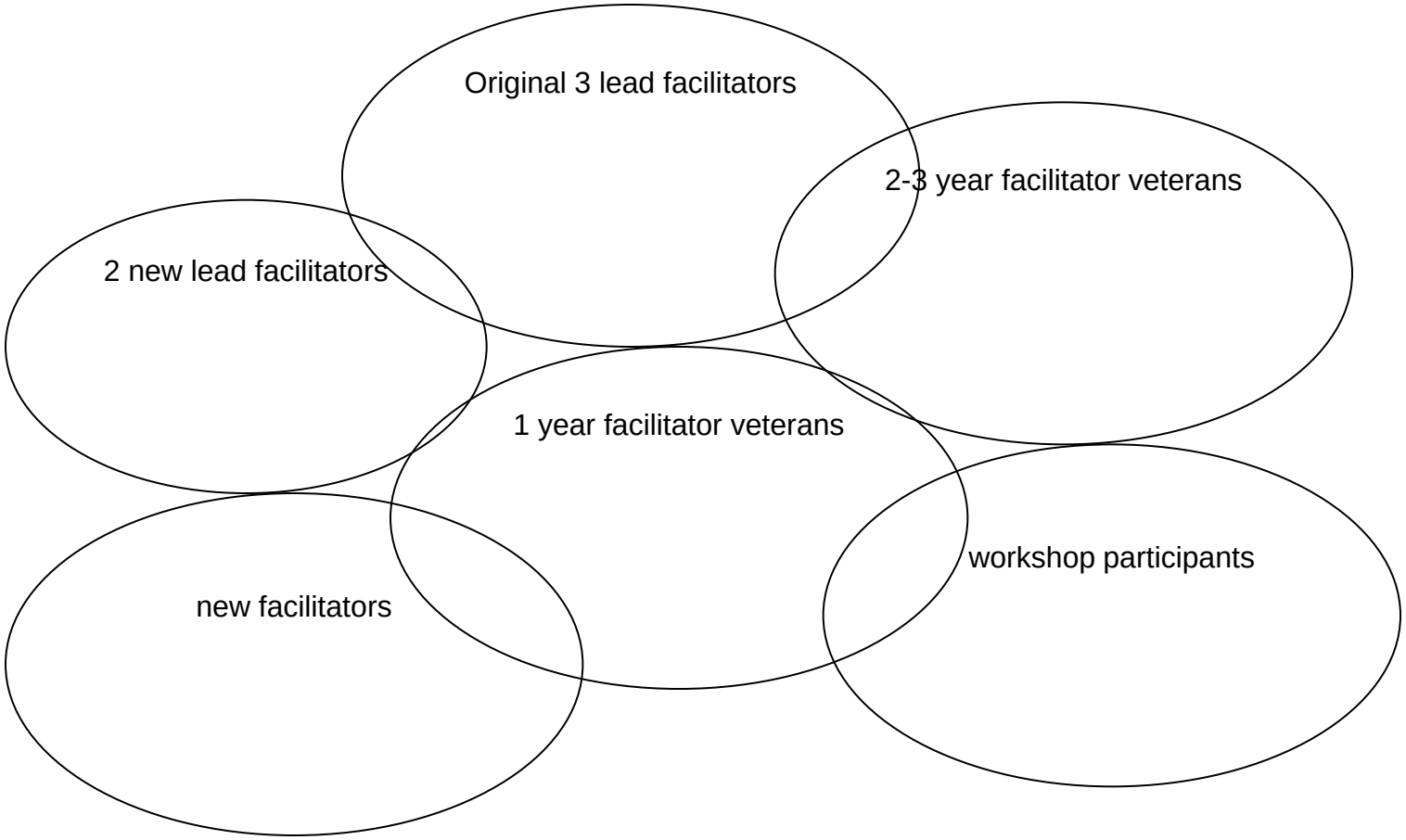
Which of Marzano's Strategies Caught Your Attention?



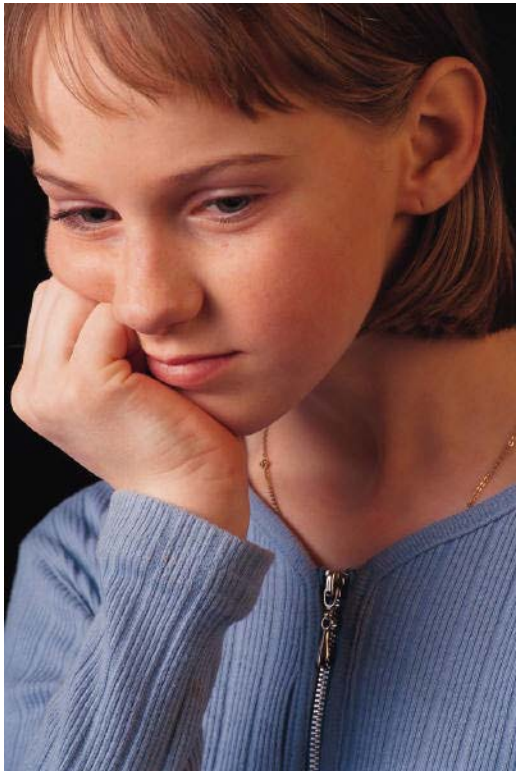
Theory In Depth: Situated Learning

- legitimate peripheral participation
- New comers and old-timers
- Communities of practice / apprenticeship
- Participation is first partial, and grows in scope and complexity
- Knowledge circulating among peers and near-peers
- Inexperience is “an asset to be exploited” (Lave & Wenger, 1991, 117).

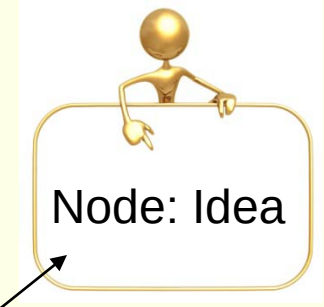
Layers of Jazz Learning Community



How is Your Learning Situated?

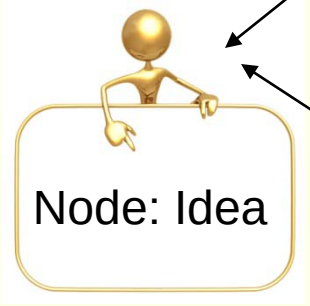


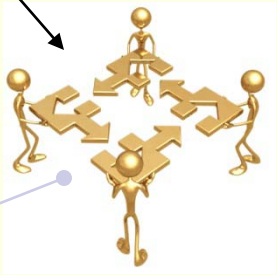
Chaos: a “cryptic form of order”; everything connected to everything



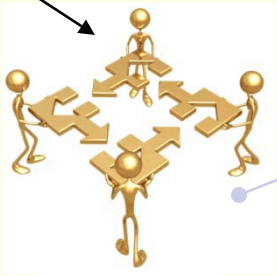
Node: Community

Learning may reside in non-human appliances



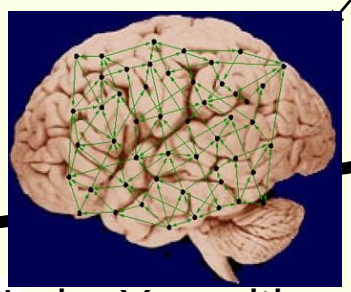


Node: Field



Weak ties: short connections between information

Node: Field

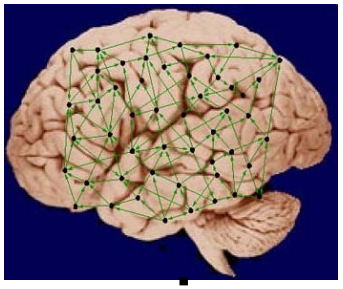


Node: You with knowledge distributed across your brain

Nebulous environments of shifting core elements

Siemens (2005)

…and knowledge rests in a diversity of opinions.



Learning….

… is a process of connecting specialized nodes or information sources.

Decision-making is a learning process. Choosing what to learn, the meaning of incoming information…

… may reside in non-human appliances

Core skills: ability to see connections, nurture and maintain connections for continual learning.

Goal: current, accurate, up-to-date knowledge.

Siemens (2005)

Qualitative Knowledge

Quantitative Knowledge

Distributed or Connective Knowledge

Openness

A mechanism allows all perspectives to enter into the system, be heard and interacted with by others

Diversity

Widest possible spectrum of view points

Interactivity

Knowledge produced is the product of the interaction, not just an aggregation

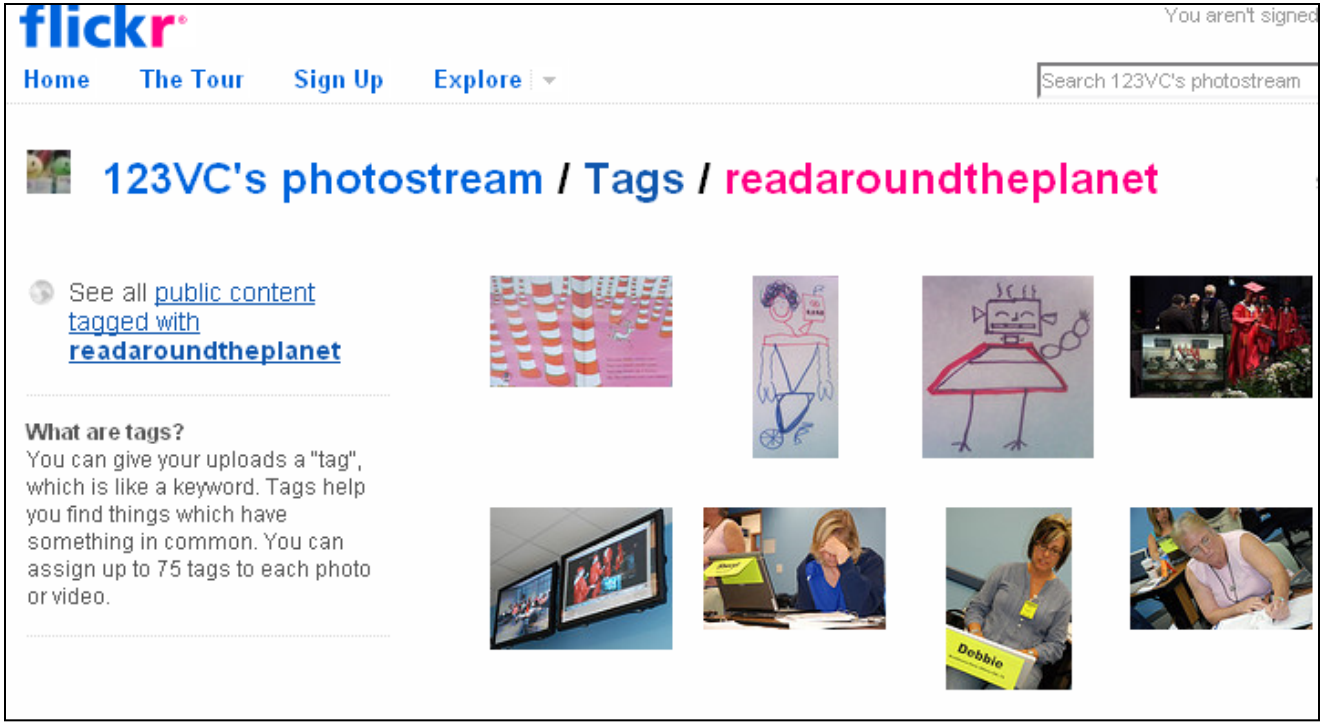
Autonomy

Individual knowers contributing on their own accord according to their own knowledge, values, decisions

Downes (2005)

Example of Learning in Non-Human Appliances

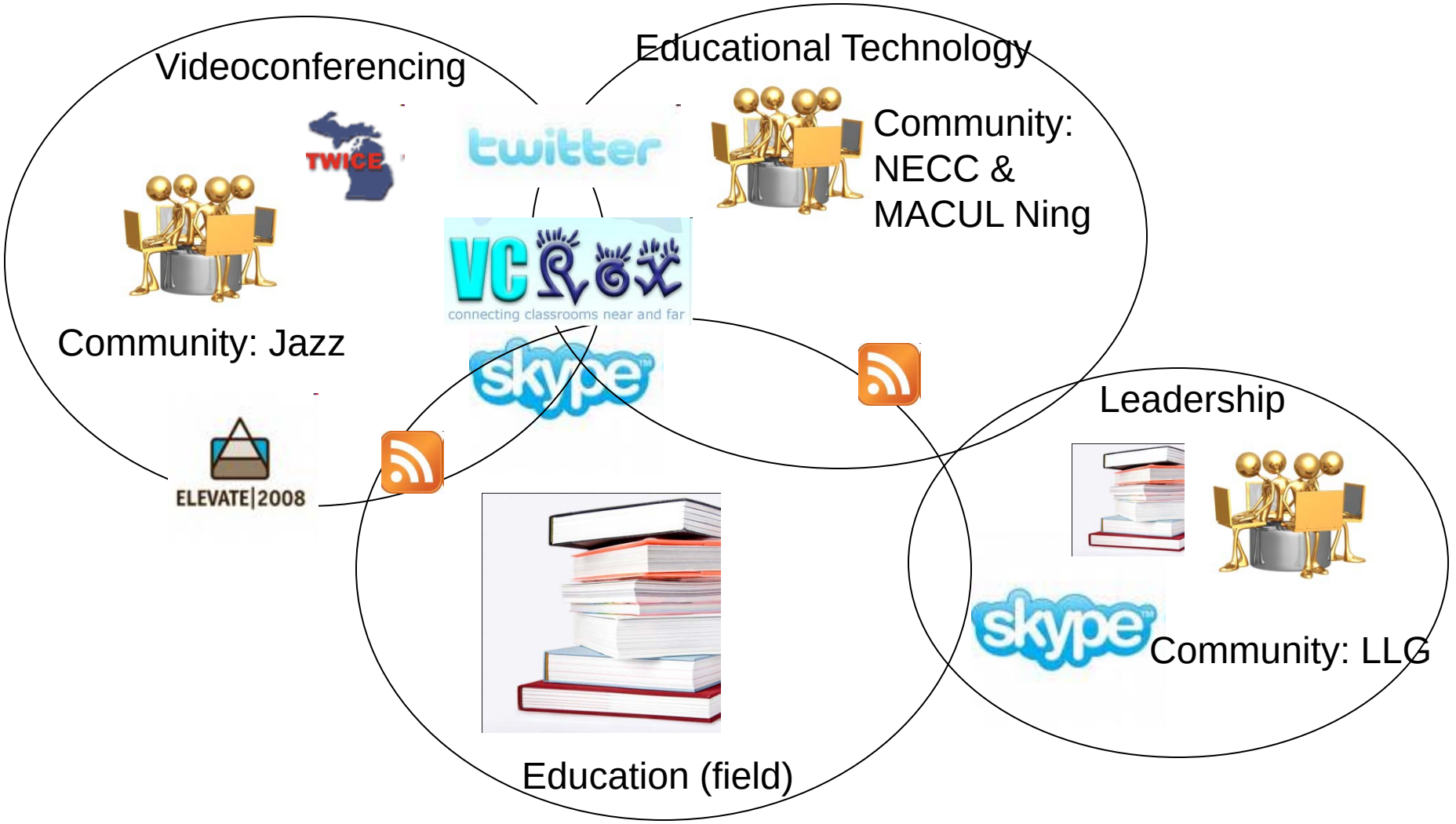
"Rapid knowledge growth requires off-loading the internal act of cognition, sense and meaning making, and filtering to a network consisting of human and technology nodes."

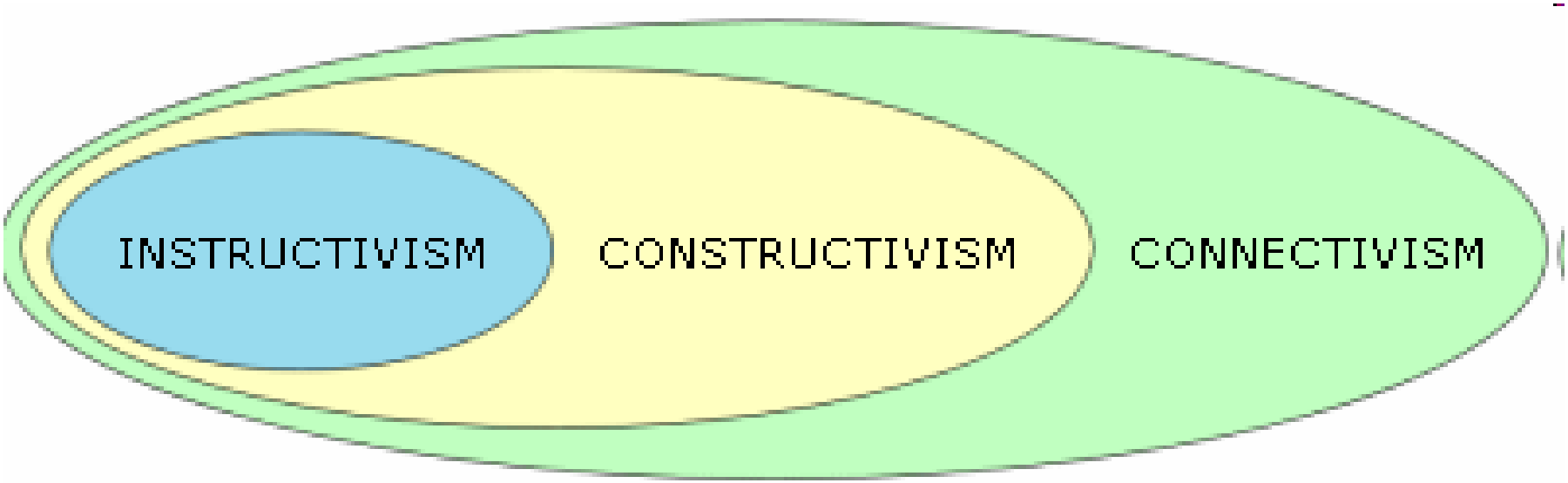


"The popular tag feature of many sites (del.icio.us, digg.com, flickr), enable pattern recognition that captures the activities of thousands or millions of individuals. As knowledge complexifies, patterns, not individual elements, become of greatest importance in gaining understanding."

Siemens (2006)

My Connectivist Learning Network





http://ryan2point0.wordpress.com/2009/03/17/instructivism-constructivism-or-connectivism/

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