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Teaching & Learning Unit

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Johor Bharu

SHARING BEST PRACTICES IN 21ST CENTURY TEACHING & LEARNING

Characteristics of 21st Century Graduates

(Engineering for a Changing World, Duderstadt)

- Analytical Skills
- Practical Ingenuity
- Creativity
- Communication
- Leadership
- Team Working
- Professionalism
- Dynamic, agility, resilience
- Lifelong Learners
- Function in global economy
- Principles of business & management
- Ethics

Table 4: Comparing skills demand, 2018 vs. 2022, top ten

Today, 2018	Trending, 2022
Analytical thinking and innovation	Analytical thinking and innovation
Complex problem-solving	Active learning and learning strategies
Critical thinking and analysis	Creativity, originality and initiative
Active learning and learning strategies	Technology design and programming
Creativity, originality and initiative	Critical thinking and analysis
Attention to detail, trustworthiness	Complex problem-solving
Emotional intelligence	Leadership and social influence
Reasoning, problem-solving and ideation	Emotional intelligence
Leadership and social influence	Reasoning, problem-solving and ideation
Coordination and time management	Systems analysis and evaluation

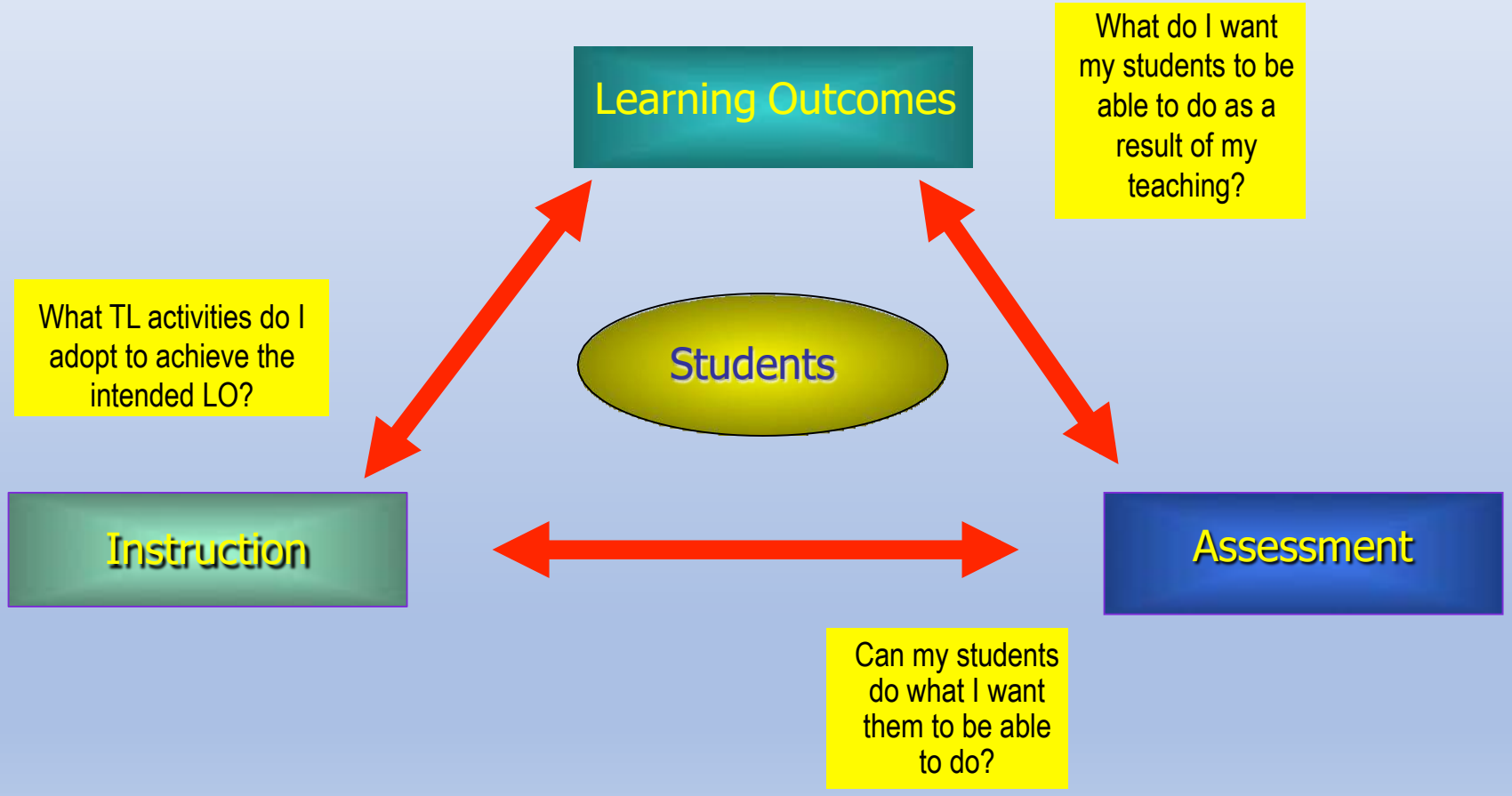
Source: Future of Jobs Survey 2018, World Economic Forum.

OUTCOME-BASED EDUCATION (OBE) grows out of concern that the education system cannot adequately prepare students for life & work in the 21st Century……

OUTCOME-BASED EDUCATION (OBE)

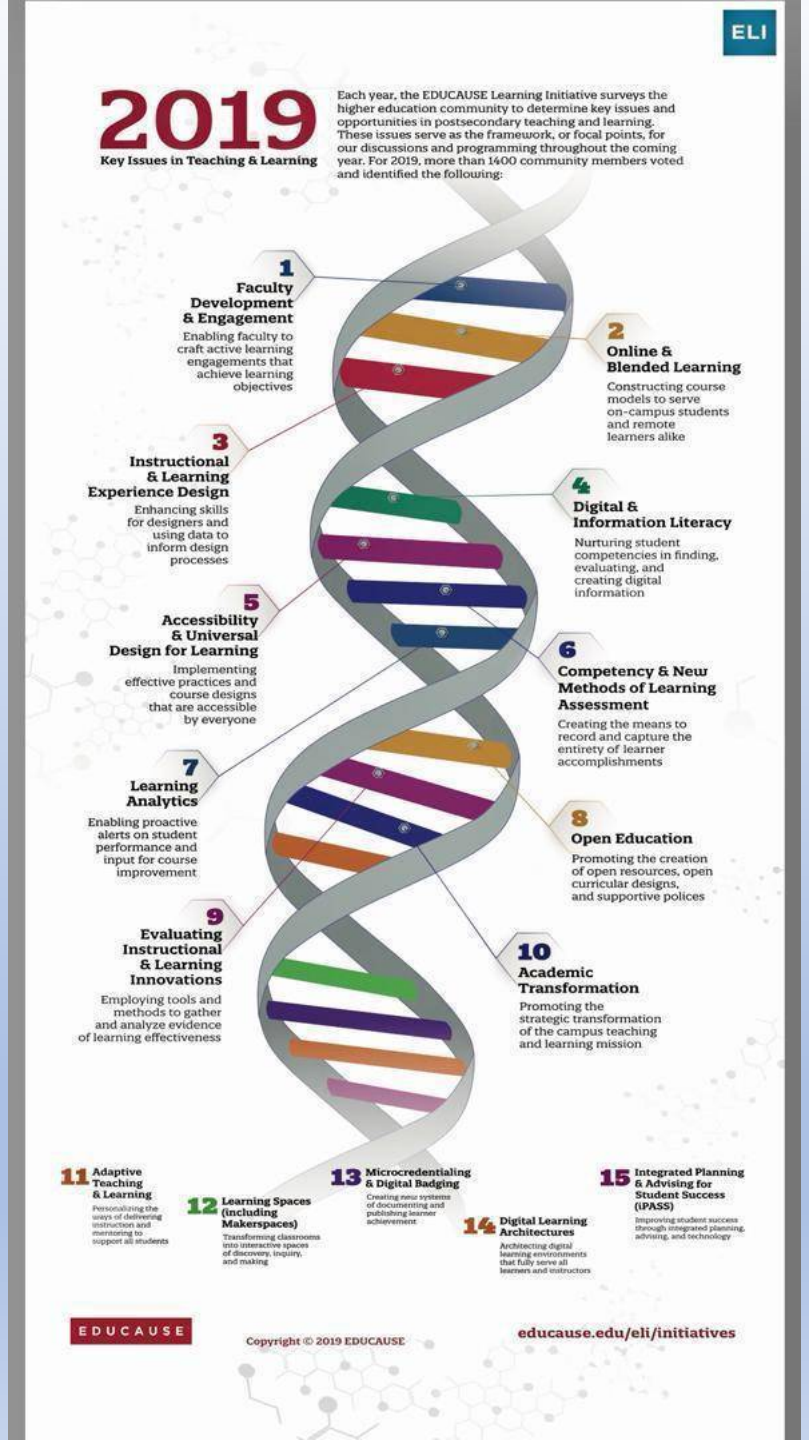
"Outcome-based education means **starting with** a clear picture of what is important for students to be able to do, **then** organizing the curriculum, instruction, and assessment to make sure that this learning ultimately happens." (Spady, 1994)

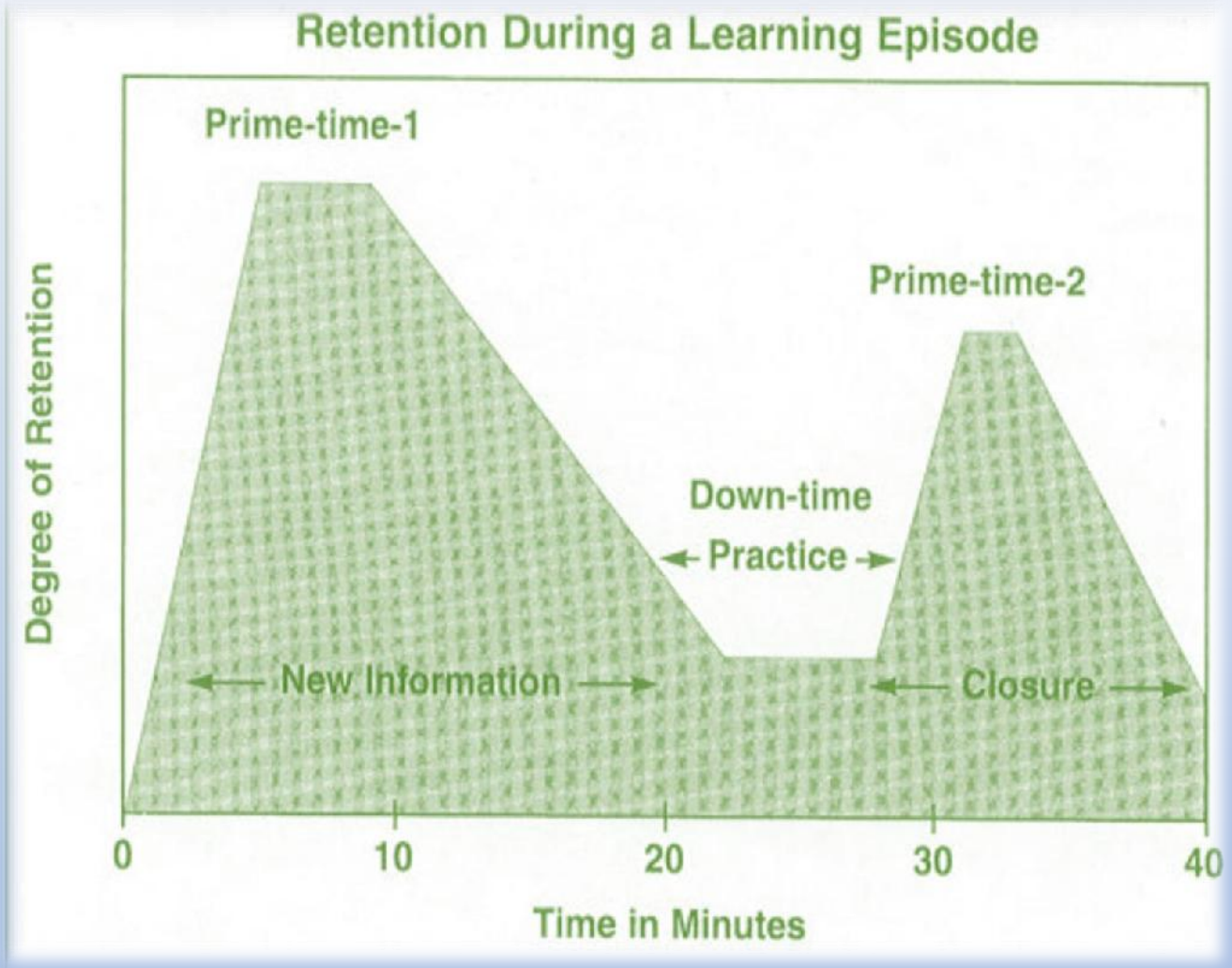
Constructive Alignment



Felder & Brent, JEE, Jan., 2003

1. **Faculty Development & Engagement- Enabling Faculty to craft active learning engagements that achieve learning objectives**





Adapted from CDIO Workshop Component 2, Dennis Sale (Singapore Polytechnic), 2012

Psychological Effects

- Primacy Effect (the tendency for the first items presented in a series to be remembered better or more easily)
- Recency Effect (the tendency for the most recently presented items or experiences to be remembered best)
- Von Restorff Effect (the tendency to remember distinct or novel items and experiences)

Adapted from CDIO Workshop Component 2, Dennis Sale (Singapore Polytechnic), 2012

Psychological Effects

- It’s not possible to be attentive for long periods of time
- We can’t take in too much information at once
- The brain needs time to process the information
- Discussing new learning and applying it in practice helps builds effective long term memory

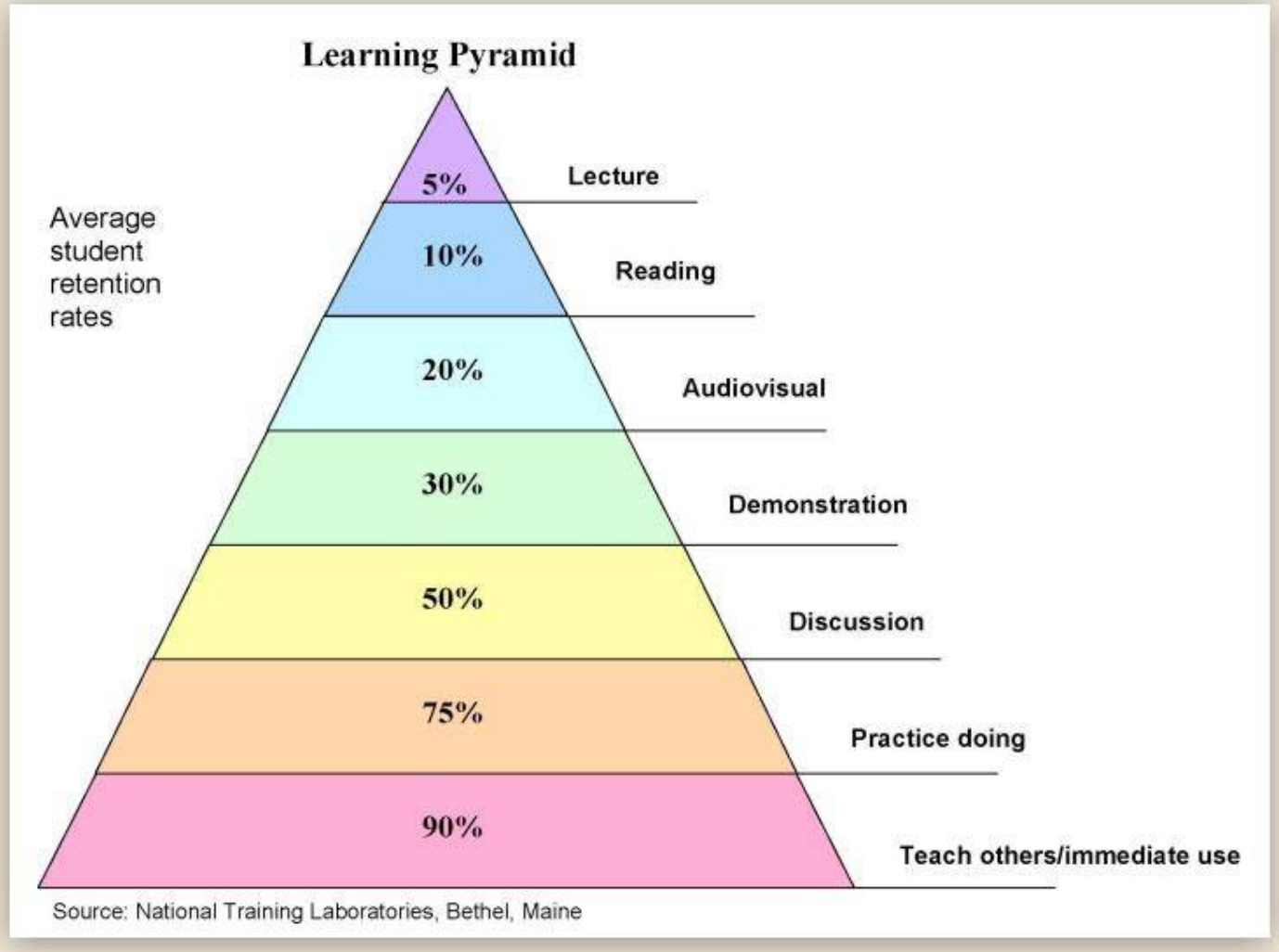
Adapted from CDIO Workshop Component 2, Dennis Sale (Singapore Polytechnic), 2012

What is Active Learning ?

Michael Prince explains, "Active learning is generally defined as any instructional method that engages students in the learning process. In short, active learning requires students to do ***meaningful*** *learning activities and* ***think*** *about what they are doing" (Prince, 2004)*

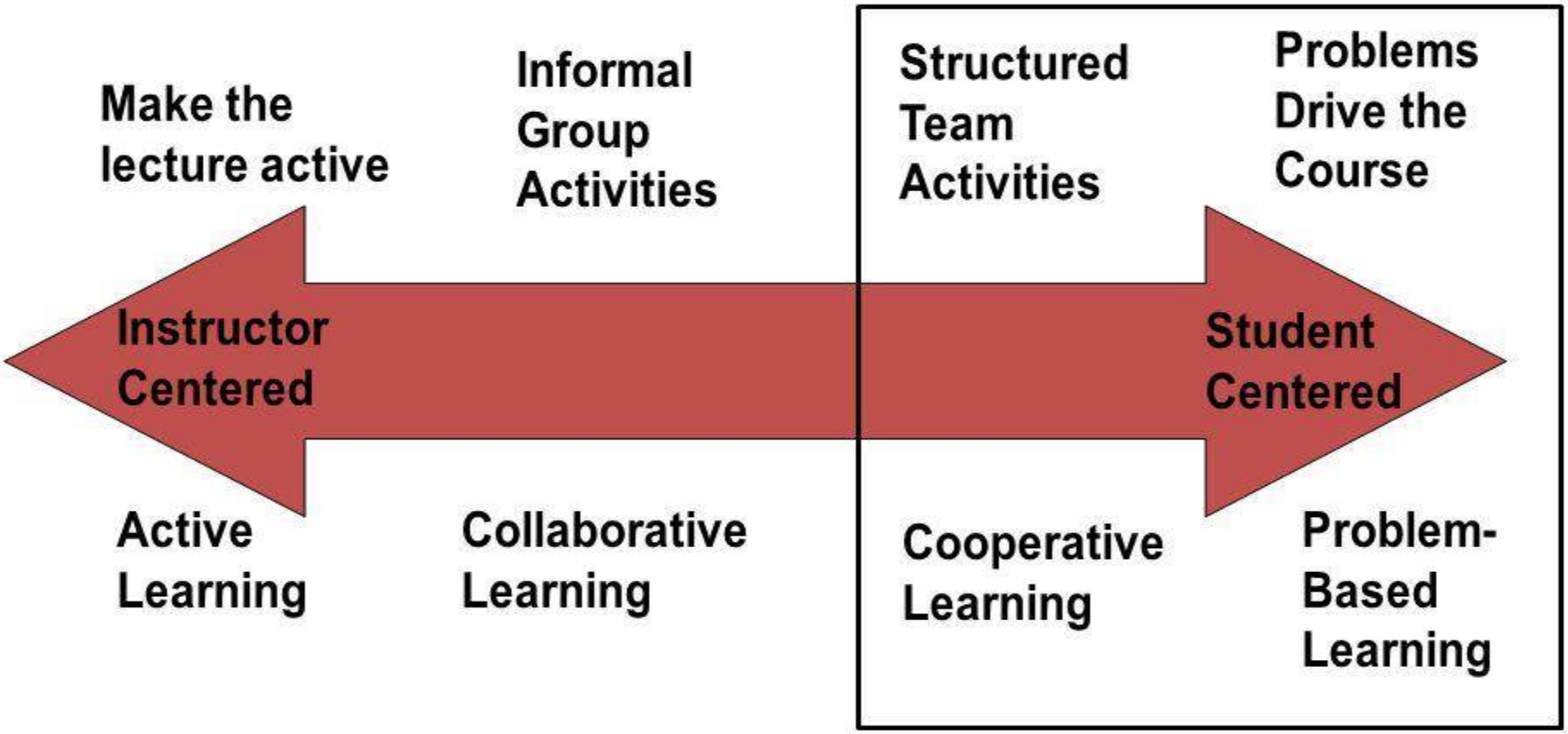
Active Learning

Active learning happens when students are given the opportunity to take a more interactive relationship with the subject matter of a course, encouraging them to generate rather than simply to receive knowledge. In an active learning environment, teachers facilitate rather than dictate the students' learning.


Learning Pyramid
Average student retention rates
5%
Lecture
10%
Reading
20%
Audiovisual
30%
Demonstration
50%
Discussion
75%
Practice doing
90%
Teach others/immediate use
Source: National Training Laboratories, Bethel, Maine

IMPLEMENTING ACTIVE LEARNING

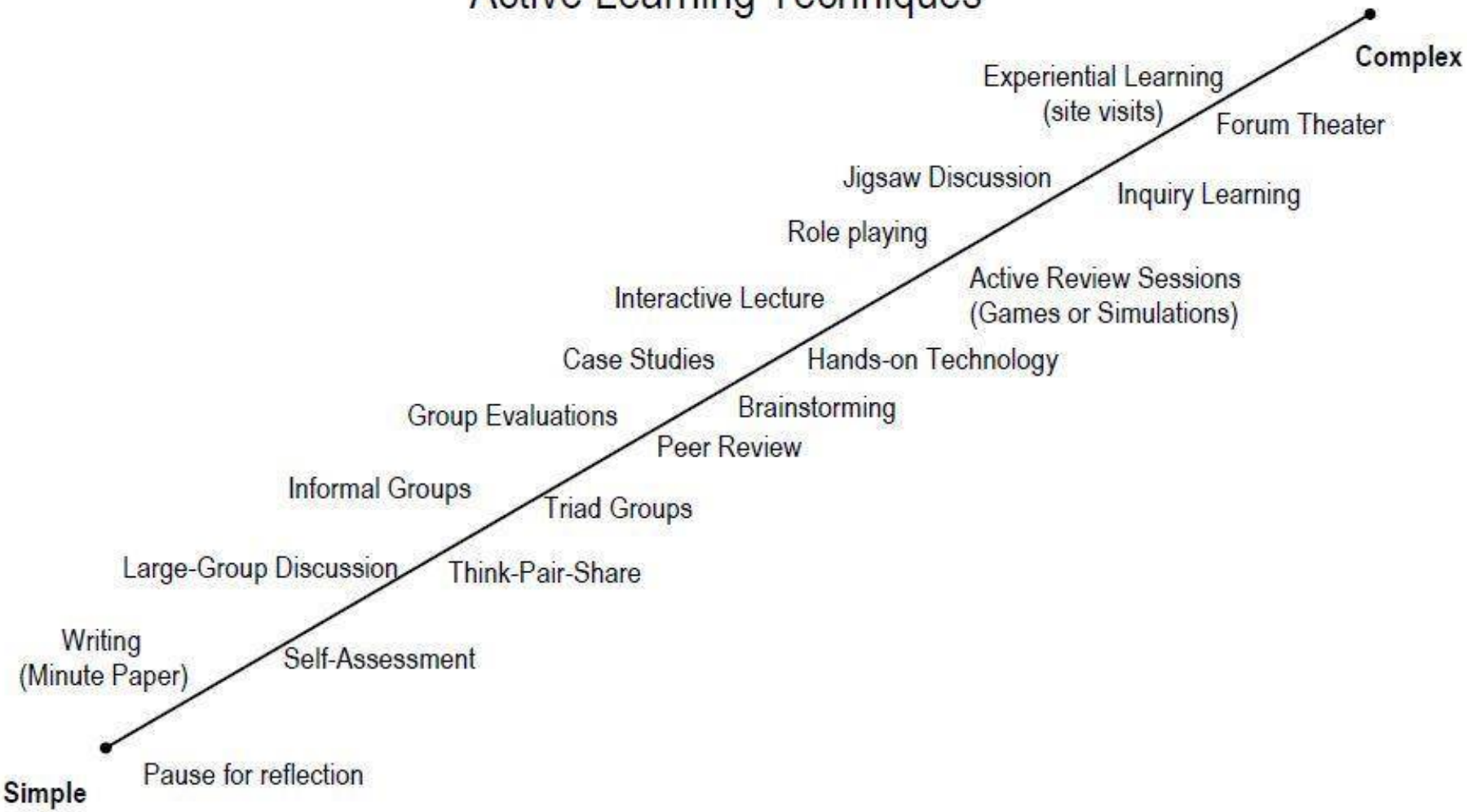
The Active Learning Continuum



Strong Evidence Base – Cooperative Learning & Challenge-Based Learning

Prince, M. (2010). NAE FOEE

Active Learning Techniques



This spectrum arranges active learning techniques by complexity and classroom time commitment.

Prepared by Chris O'Neal and Tershia Pinder-Grover, Center for Research on Learning and Teaching, University of Michigan

Bookends Approach For Small & Large Class Sizes

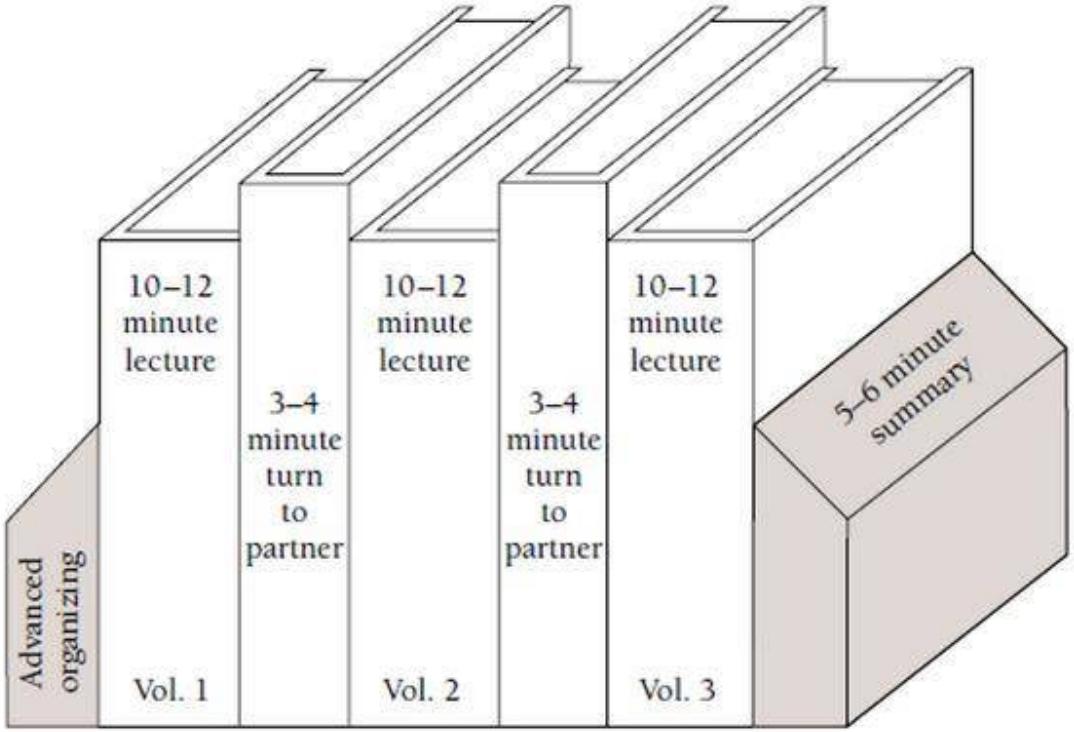
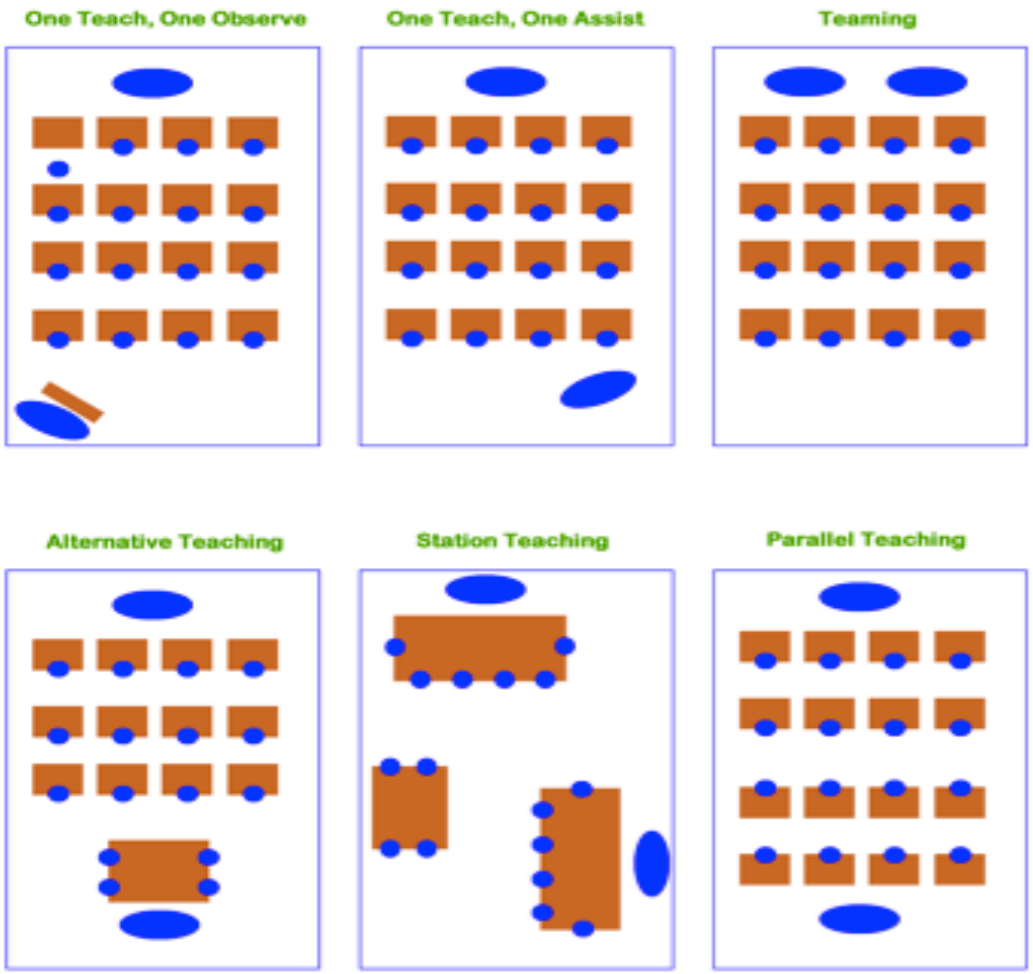
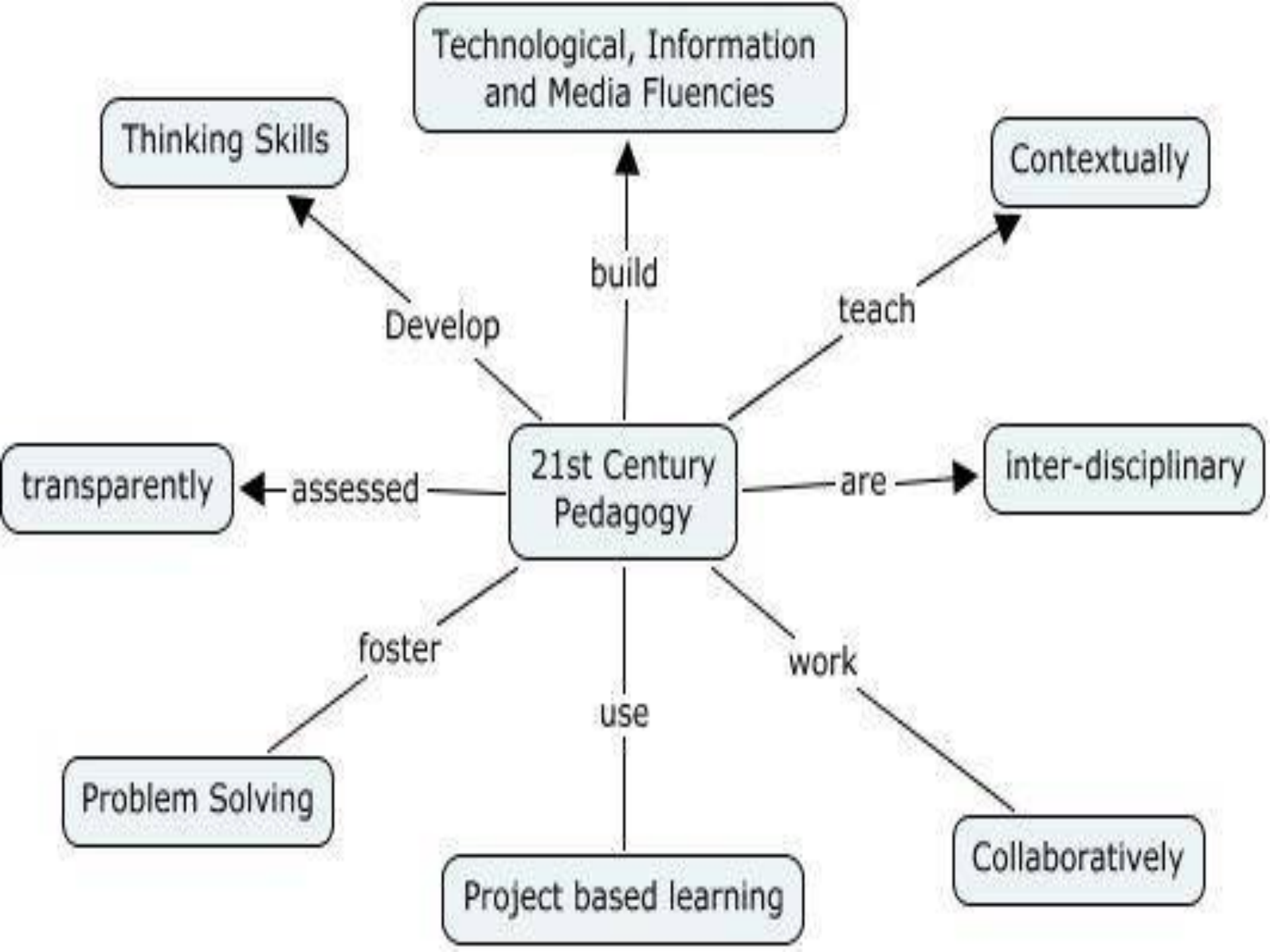


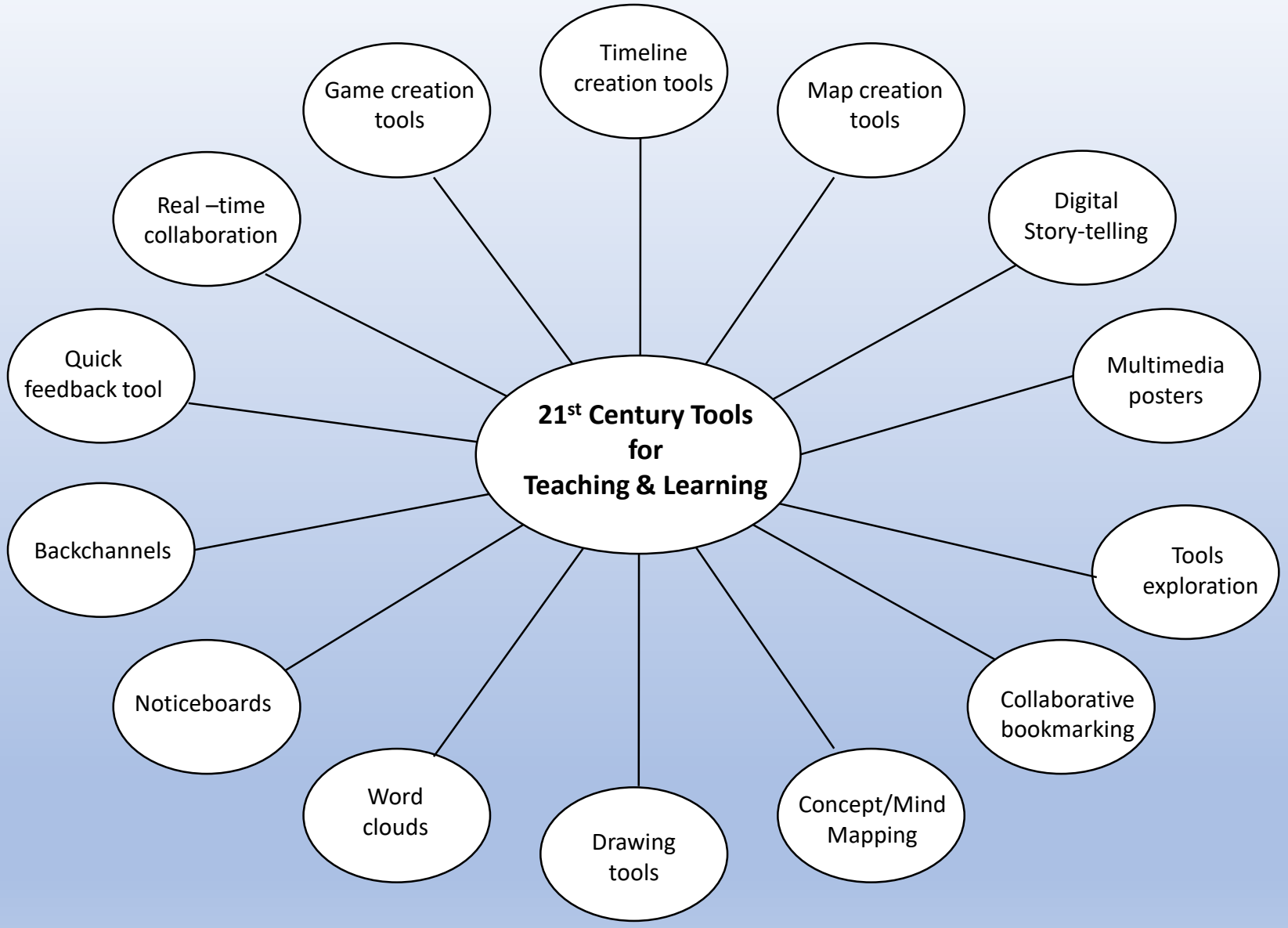
Figure taken from Smith, K. A. (2000). Going deeper: formal small group in large classes. New Directions for teaching and learning. 81.

Models of Co-Teaching



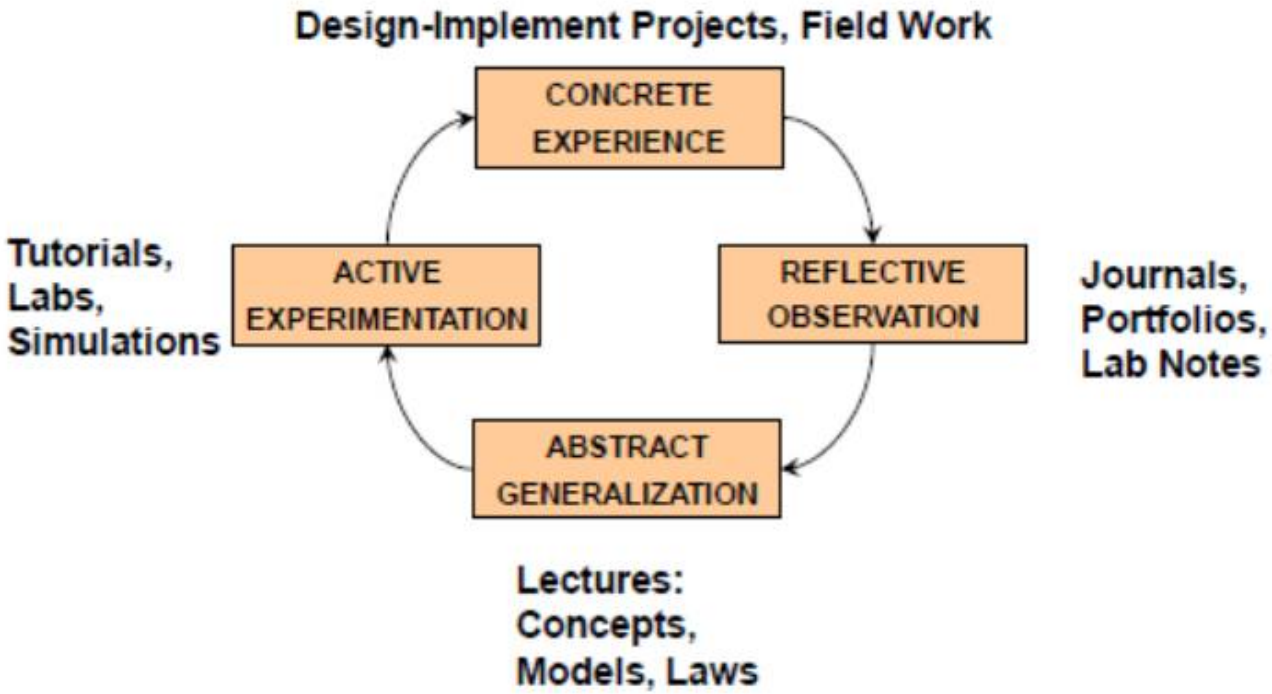
Source: Figure 4.2 Co-Teaching Approaches from Friend, M., & Bmsuck, W. D. (2009). Including students with special needs: A practical guide for classroom teachers (4th ed., p. 88). Boston: Allyn & Bacon. Copyright 2002 by Pearson Education.


Technological, Information and Media Fluencies
Thinking Skills
Contextually
build
Develop
teach
transparently
assessed
21st Century Pedagogy
are
inter-disciplinary
foster
work
use
Problem Solving
Collaboratively
Project based learning

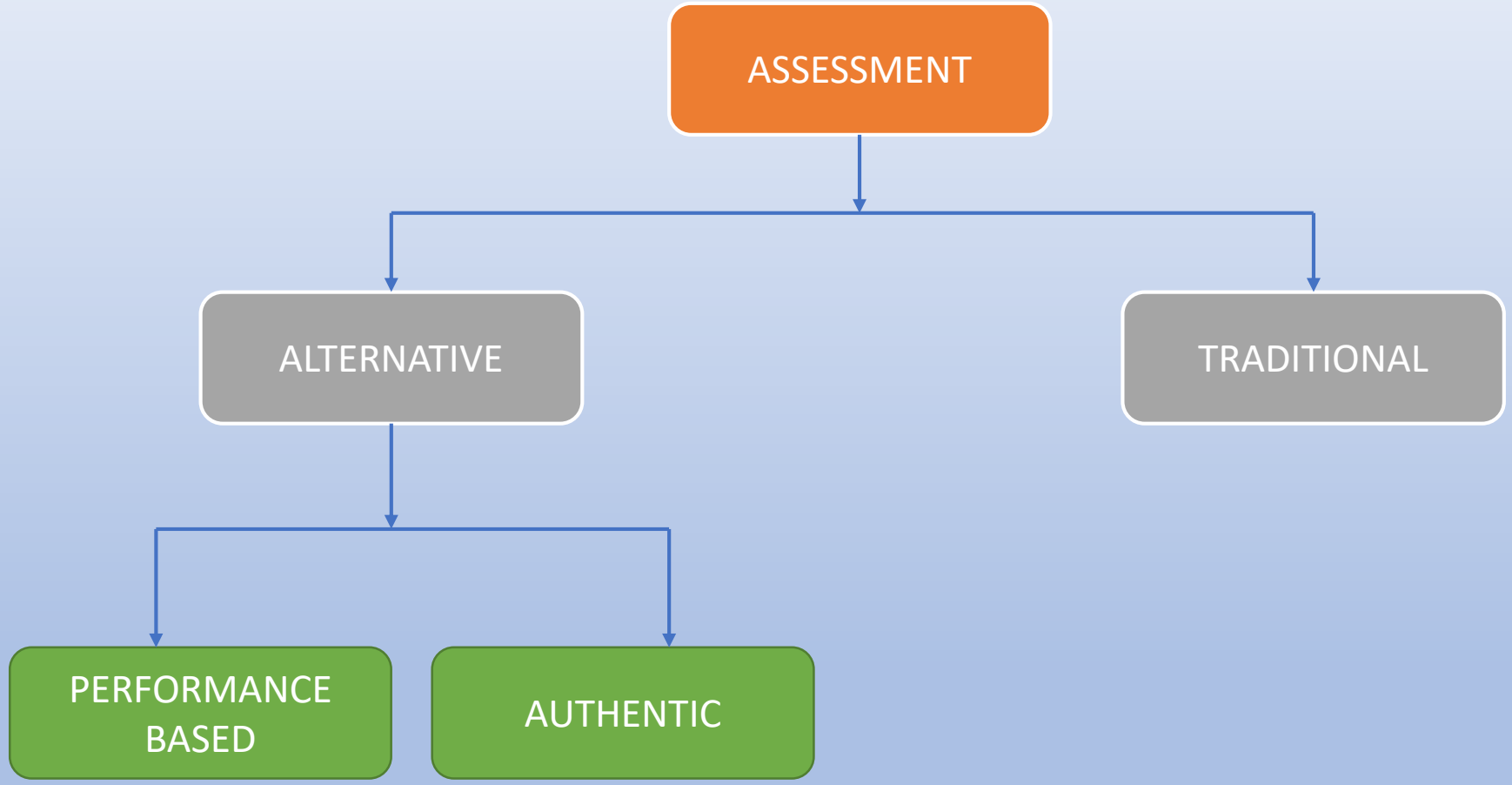


Source: http://21ctoolsoutline.weebly.com , London Centre for Leadership in Learning, Institute of Education, UK

Experiential Learning Cycle: Connecting Methods



Experiential Learning Cycle – From Kolb, 1984



Source: Dr. Adibah Abdul Latif,
School of Education, Universiti Teknologi Malaysia

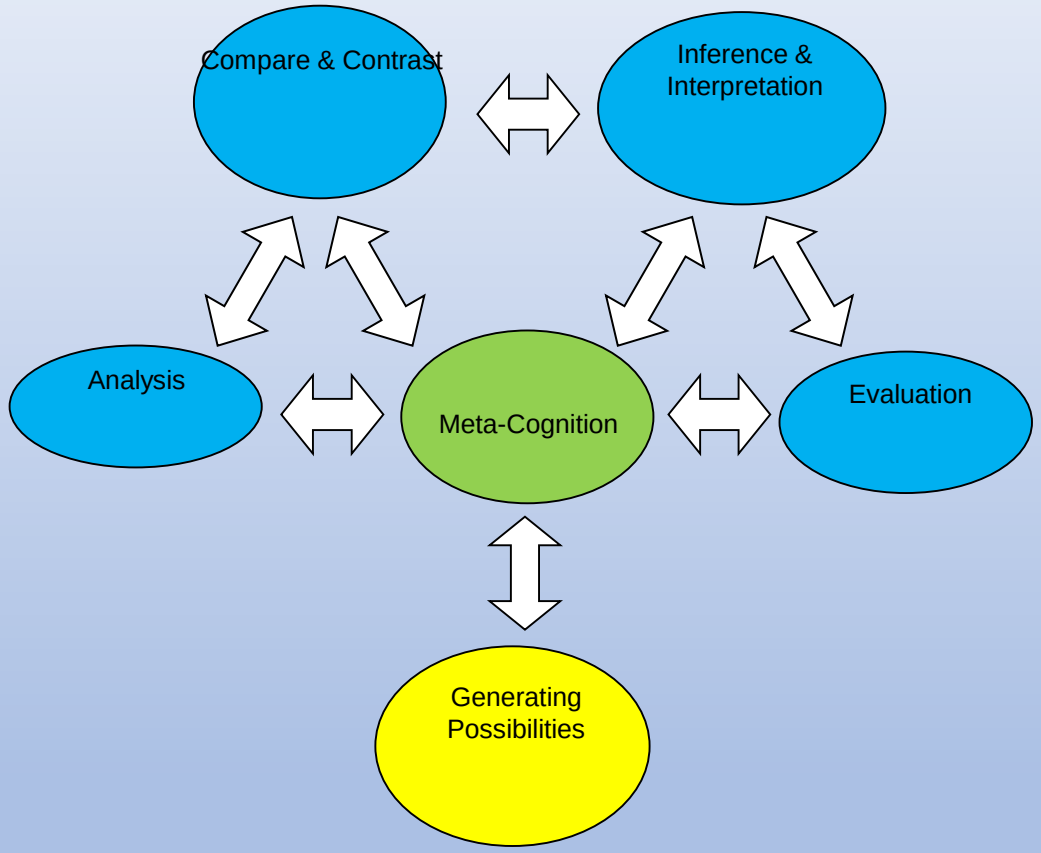
AUTHENTIC ASSESSMENT

- Not only performance based, but happen in the real setting
- Emphasizing more on process rather than product
- Soft skills development
- Holistic assessment
- Rubric

Source: Dr. Adibah Abdul Latif,
School of Education, Universiti Teknologi Malaysia

What is good thinking?

A Model of Thinking



Dennis Sale, 7-9 June 2012, Temasek Foundation-Singapore Polytechnic, CDIO Workshop

10 Core Principles of Learning

1. Learning goals, objectives and expectations are clearly communicated
2. Learners' prior knowledge is activated and connected to new learning
3. Motivational and Attentional strategies are incorporated into learning designs
4. Content is organized around key concepts and principles that are fundamental to understanding the key structure of a subject
5. Self-directed learning is encouraged through facilitating the development of good thinking

**The Challenge of Reframing Engineering Education, Dennis Sale, Springer 2014*

10 Core Principles of Learning

6. Instructional methods and presentation mediums engage the range of human senses (e.g. visual, auditory, kinaesthetic)
7. Learning design takes into account the working of memory systems
8. Learner competence is promoted through active and experiential learning
9. A psychological climate is created which is positive, success orientated and promotes self-esteem
10. Assessment practices are integrated into the learning design to promote desired learning outcomes and provide quality feedback

**The Challenge of Reframing Engineering Education, Dennis Sale, Springer 2014*

I Learned Something Today!

….Thank you