Infusing Problem Based Learning Into Technical Programs

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Why Is This Important?

- Teach for meaning & understanding
- Transfer of principles and knowledge
- Foster analysis and problem solving
- Adaptive expertise
  - Novel solutions to unfamiliar problems
  - Creativity and “out of the box” thinking
- Increase student’s value proposition in a world where skills are commodities

Why is this really important???

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BATEC
Information Technology Workforce Skills Study

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From Industry:

"Whenever we asked employers what they wished applicants had more of, technical skills were never mentioned first."

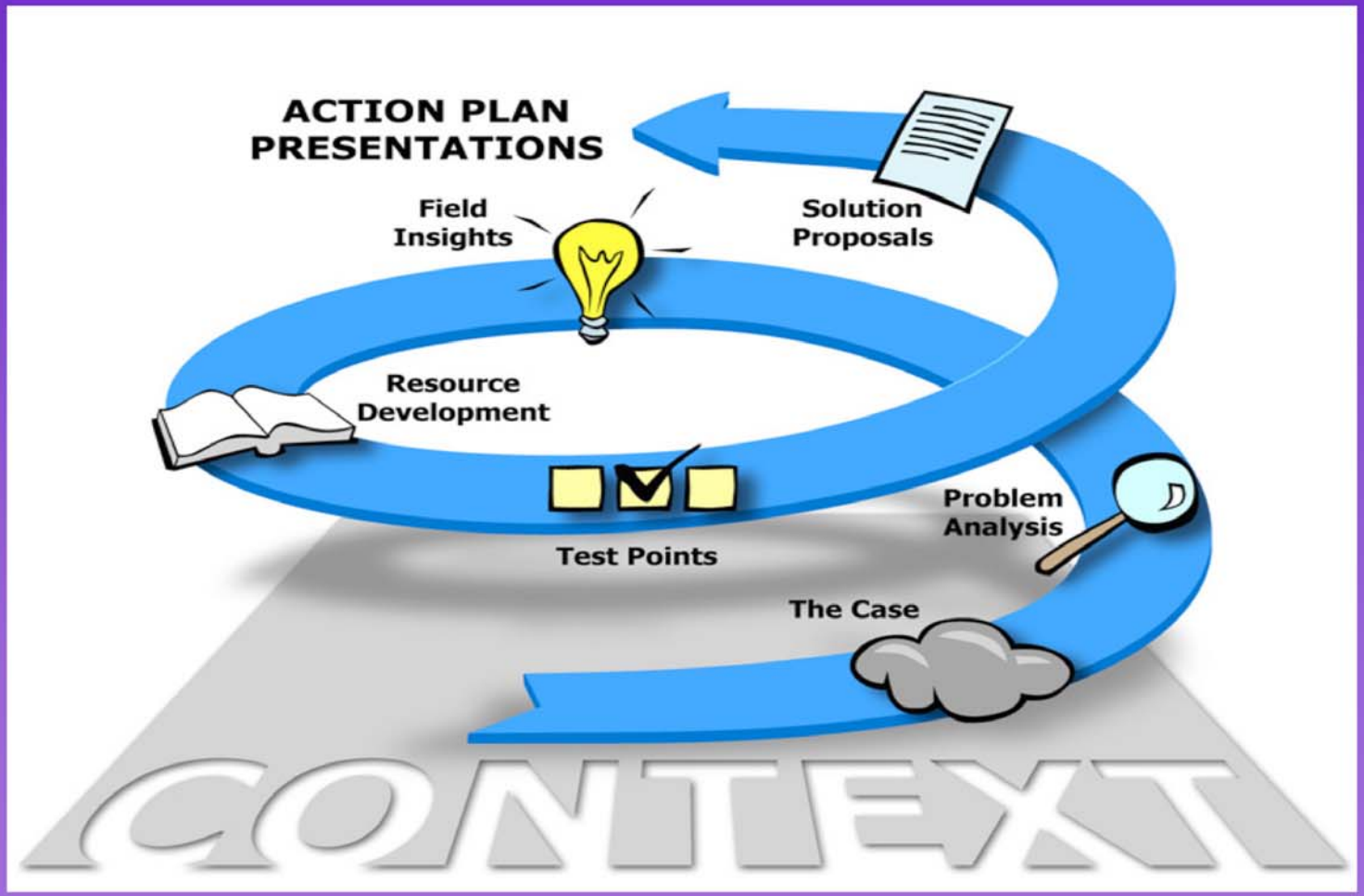
What's going on now?

- What are you doing?
- What's working?
- What needs more help?
- What would you like to come away from this session with?

Ideal Components of PBCBL

- Authentic industry based problem
- Students must gather data in context
- Students must consider multiple perspectives - uncover knowledge (field insights)
- Students must consider solution alternatives and what's required (gather resources)
- Students must test alternatives (test points) and defend rationale for selection or rejection based on criteria they discover (solution proposals)

PBCBL Learning Cycle



Adapted from The Case Files Project

Nashville State Technical College

The Saflund Institute

PBCBL

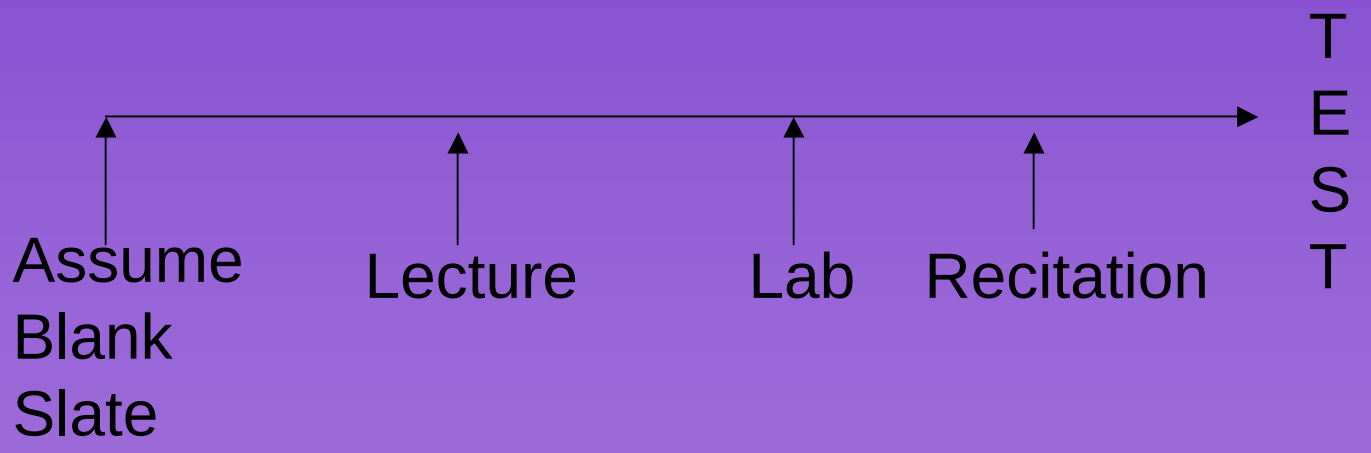
- Involves “whole brain” activities
- That is, learning for meaning and understanding by involving:
  - Visual cortex
  - Auditory centers
  - Kinesthetic (sensory motor)
  - Social interaction (“uncovery” - develop new meaning through examining other interpretations)
  - Emotional responses (limbic brain)
  - Reinforcing, expanding, or correcting prior knowledge or beliefs

Ref: How People Learn - Bransford et. al.
National Academies Press

How do we know….?

- When we are teaching for meaning
- Students have developed true understanding
- We can demonstrate transfer of principles
- Students have become creative problem solvers

Consider - The Traditional Technical Instructional Model



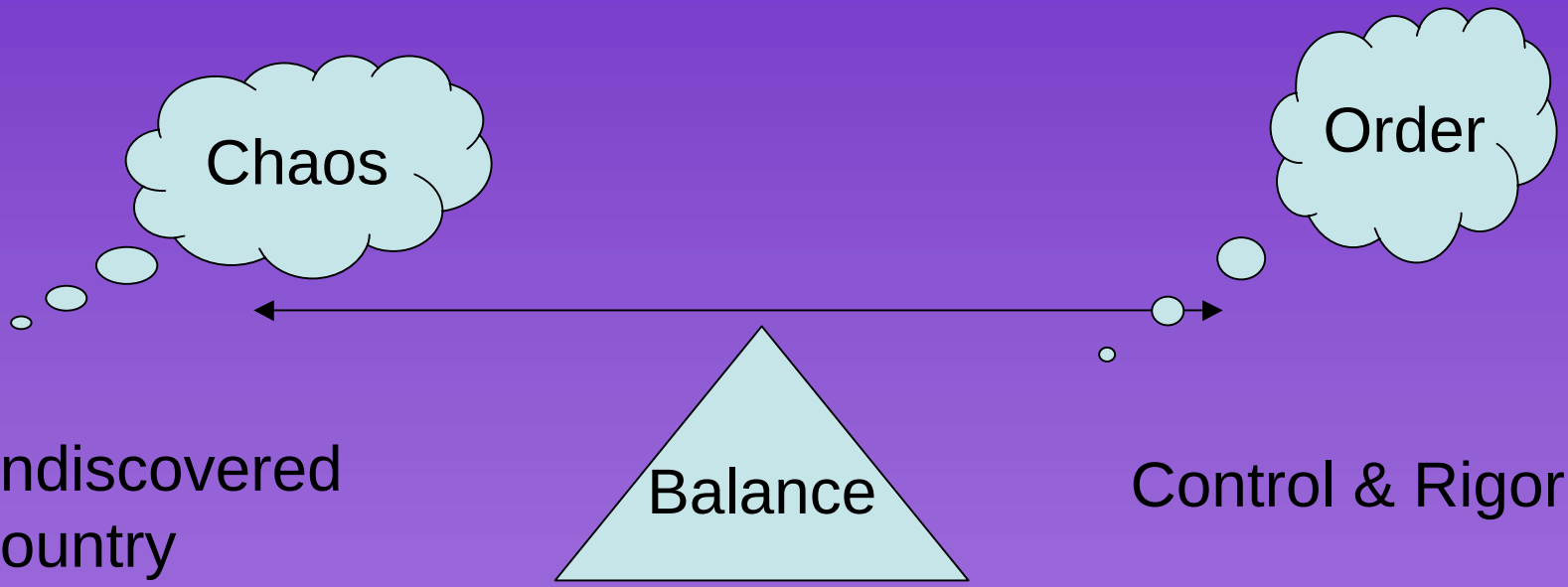
What's so damn wrong with this model? I mean …..

- It won World War II
- It built the A-Bomb
- It got us to the moon and back
- It built microprocessors
- Other countries send their students to the USA to study

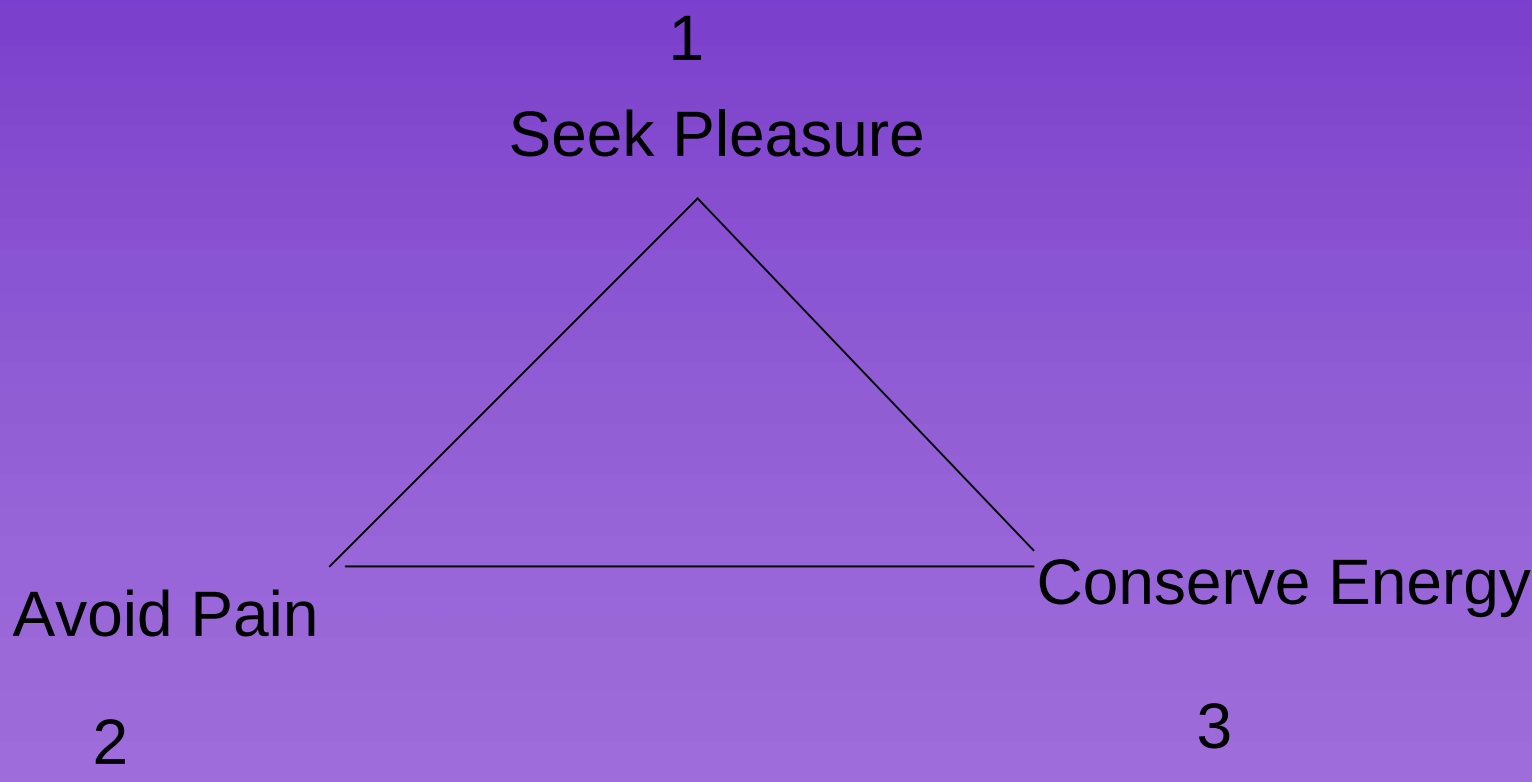
A few things …..

- Teacher-centric
- Grounded in traditional behaviorism
- Favors left-brain passive, auditory receptive learners and one-way flow
- Offers few ways to test for meaning
- Offers even fewer ways to test for transfer of principles……..
- But it is very, very, very safe

What are we afraid of?



What We Decide To Do Is Based on Emotion more than reason… The Motivational Triad



Why do we hesitate to do this?

- Technical educators were not hired to be instructional designers.
- Student resistance - “I’m here to be taught, not to learn.”
- Logistics - employer involvement, internal angst, institutional issues
- I only have 5 years to go to retirement and I’m tenured

In other words …..

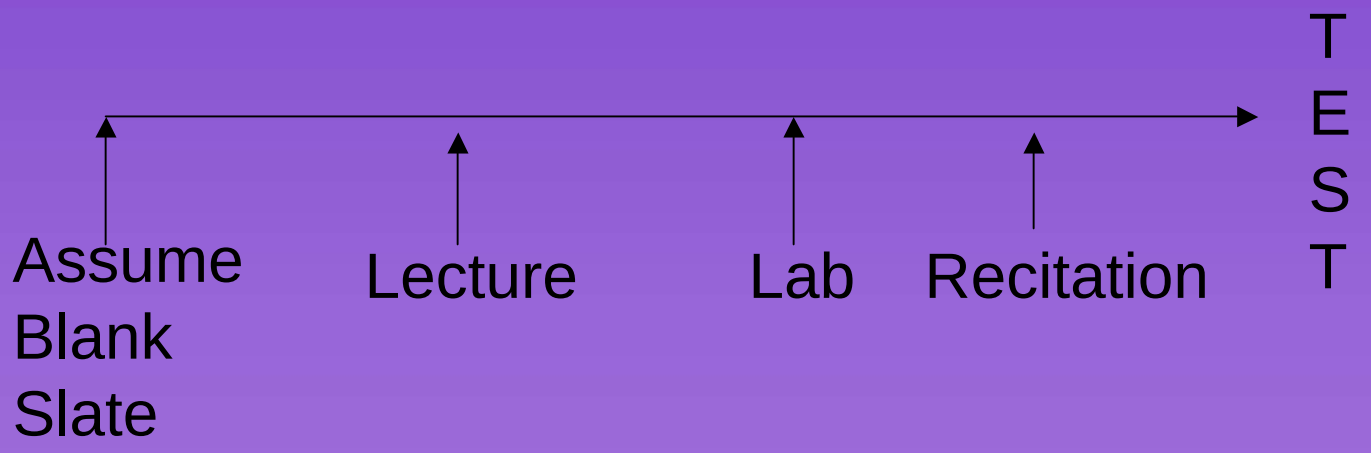
- Conserve energy (“Lazy”)
- Avoid Pain
- We think the rewards (seek pleasure) are too distal.
- Students may not see the ultimate benefit, only the immediate difficulty

So ……

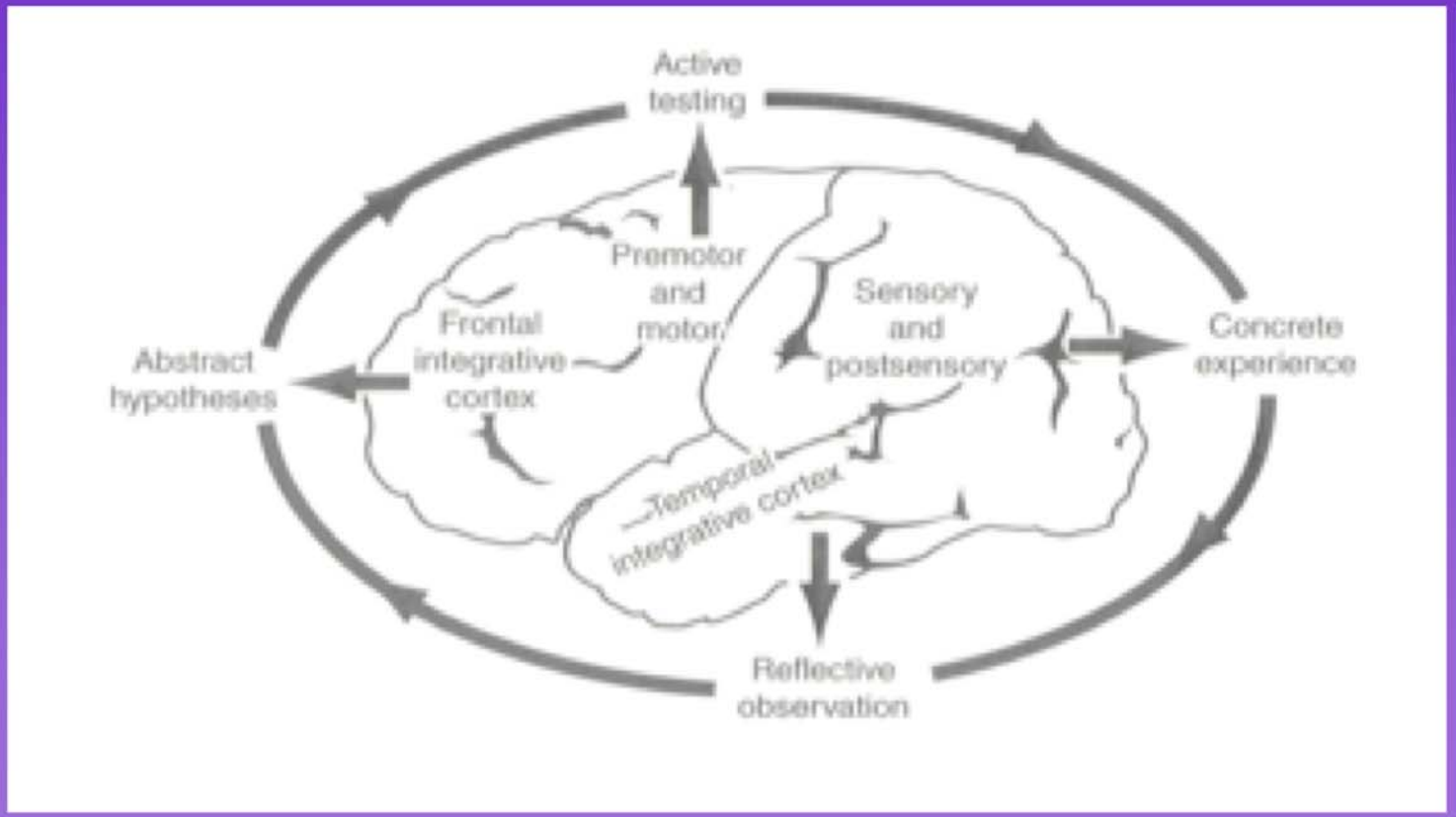
Let's compare what we normally do to the 4-step whole brain learning process depicted below

1) We have a Concrete **experience**
2) We develop **Reflective Observation** and Connections
3) We generate **Abstract hypothesis**,
4) We then do **Active testing** of those hypotheses, and therefore have a new Concrete experience, and a new Learning Cycle ensues.

Consider - The Traditional Technical Instructional Model



Whole brain 4-step process



Graphic courtesy Dr. James Zull, Professor of Biology and Neuroscience - Case Western Reserve University

So how can I ease into this ?

- Have students develop and write a qualitative strategy for approaching the solution to a problem
- Let students design their own lab exercises to further develop principles learned in lecture and/or from textbook
- Have students develop and present their own mini-lectures to their cohorts first (you never really know something until you have to teach it)

Will Standards Help?

- Properly crafted standards integrate technical, academic, and employability skills for work elements.
- Remember … it's *job roles*, not job titles that matter.
- Standards can help involve industry in assessment especially in affective domain skills

Part II

Workshop

Applied Question and Answer

Wrap up