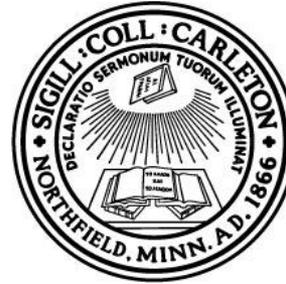




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Deep Learning: What we know about the Brain, Active Reflection, and the Development of Agency

Dr. Julie Tetley

The United States Air Force Academy

Chief, Academic Advising and First-Year Programs

Assistant Professor

My Perspectives and Background

The United States Air Force Academy

- Highly selective, ~4,500 cadets
- Academic, Military, and Athletic Mission
- Newly created division focused on advising undeclared students and administering the First-year programs.

Colorado College

- Small (~2000 students), highly selective, liberal arts
- Supplementary advisor for first-and second-year students
- Involvement with ACM

Doctoral Program

- George Washington University
- Dissertation: An Investigation of Self-Authorship, Hope, and Meaning in Life among Second-year College Students



Presentation Overview

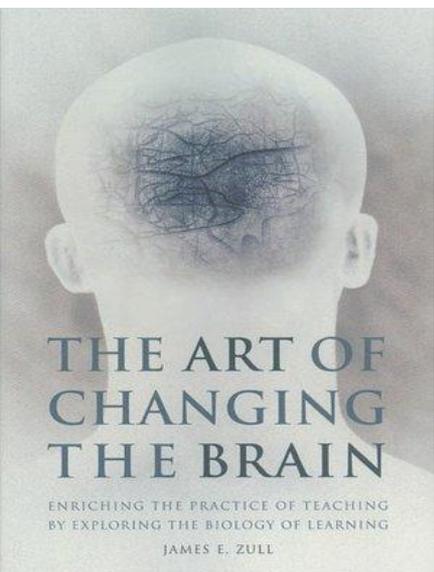
- The Brain and Learning
- The Power of Reflection
 - Reflective Practices
- Hope, Agency, and Self-Authorship
- Applications
 - Academic Advising
 - FYE



Learning Objectives

- As a result of this interactive presentation, you should be able to:
 - Describe the functions of the Frontal Lobe and understand how lack of development may impact learning
 - Explain the connections between Kolb’s Learning Cycle and the Brain
 - Articulate why reflection leads to deep, transformative learning
 - Apply at least one reflective activity to your own teaching
 - Define “agency” and create at least one activity in your discipline that would increase students’ development of agency/self-authorship
 - Identify students’ various levels of intellectual development
 - Apply what you have learned to advance the work of the FACE grant

Western Kolb's teachers Repeat James book students take
 provides Brain Practice networks
 Biology Art Experience
 Changing Learning Teaching Zull
 strategies learn process together trying University
 Kolb's model metaphors engaging ideas David Zull
 understand engaging ideas reflection
 reflection



Why do most 16-year-olds drive like they're *missing a part of their brain?*



BECAUSE THEY ARE.



EVEN BRIGHT, MATURE TEENAGERS SOMETIMES DO THINGS THAT ARE 'STUPID'

But when that happens, it's not really their fault. It's because their brain hasn't finished developing. The underdeveloped area is called the dorsal lateral prefrontal cortex. It plays a critical role in decision making, problem solving and understanding future consequences of today's actions. Problem is, it won't be fully mature until they're into their 20s.

It's one reason 16-year-old drivers have crash rates three times higher than 17-year-olds and five times higher

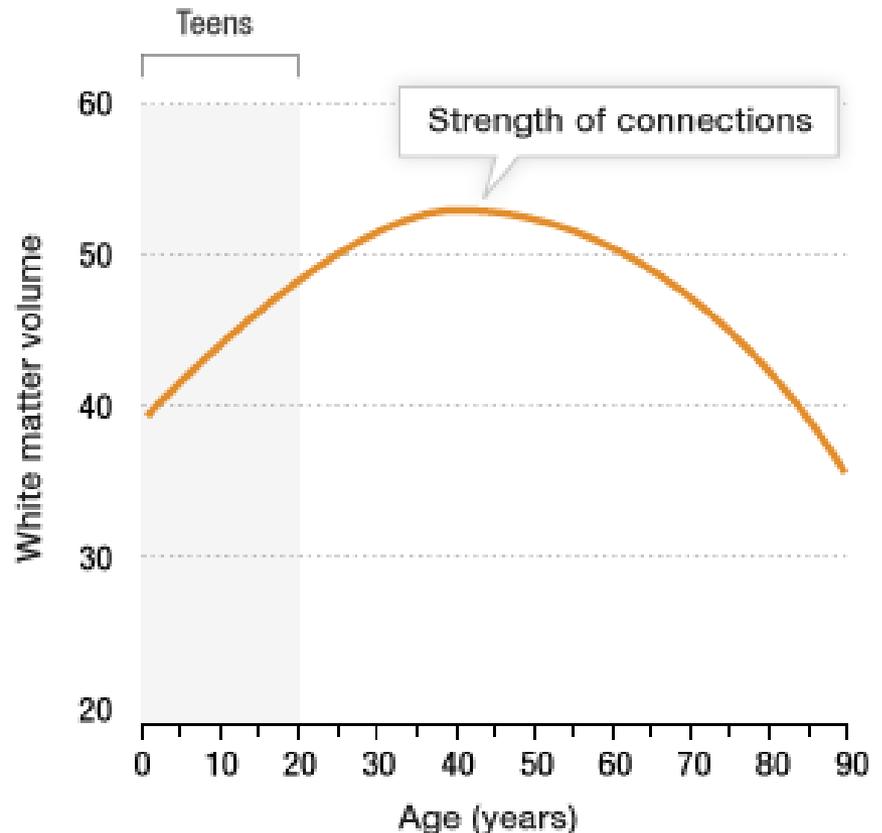
crashes. These laws restrict the more dangerous kinds of driving teens do, such as nighttime driving and driving with teen passengers. Since North Carolina implemented one of the most comprehensive GDL laws in the country, it has seen a 25% decline in crashes involving 16-year-olds.

To find out what the GDL laws are in your state, visit Allstate.com/teen. Help enforce them—and if they aren't strong enough, ask your legislator to strengthen them.

Let's help our teenagers not miss out on tomorrow just

Teen Brains Are Not Fully Connected

- The brain's "white matter" enables nerve signals to flow freely between different parts of the brain.
- In teenagers, the part that governs judgment is the last to be fully connected. (Frontal Lobe)



Growing a Grown-up Brain

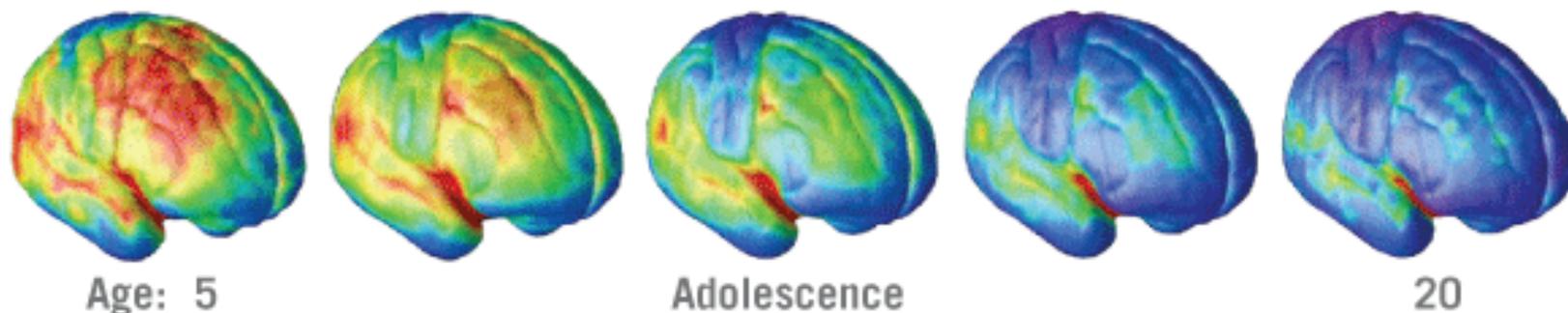
Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.

Gray matter density

Gray matter becomes less dense as the brain matures.



More dense Less dense



Gray matter: Nerve cell bodies and fibers that make up the bulk of the brain's computing power.

Parietal lobe: Spatial perception

Occipital lobe: Vision

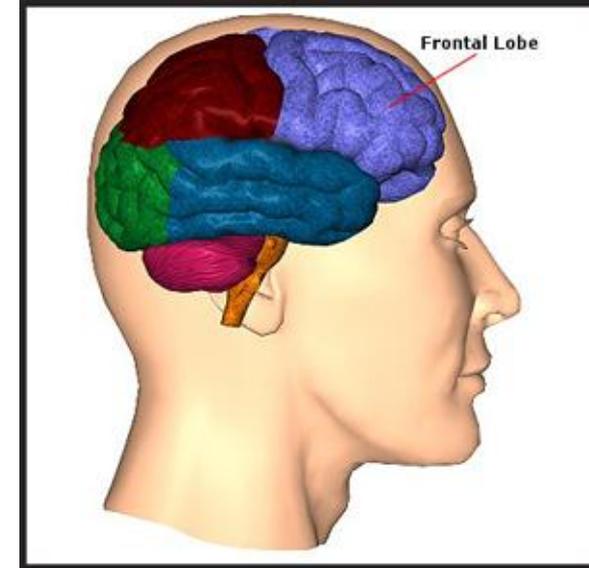
Temporal lobe: Memory, hearing, language

Frontal lobe: Planning, emotional control, problem solving

Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., *Proceedings of the National Academy of Sciences*, May 25, 2004; California Institute of Technology

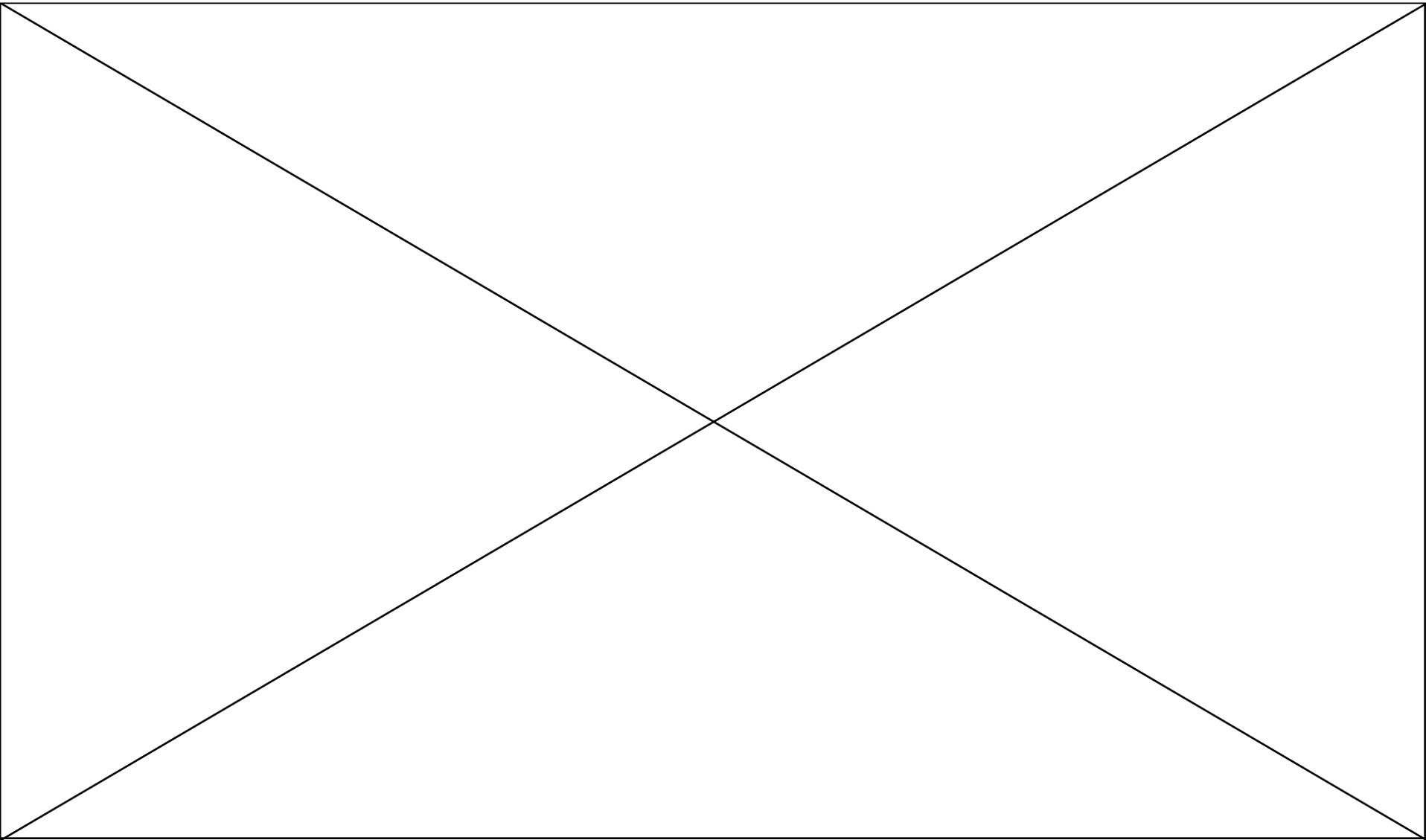
Frontal Lobe Functions

- Focusing attention
- Organizing thoughts, problem solving
- Weighing consequences
- Considering the future, making predictions
- Forming strategies and planning
- Balancing short-term rewards with long term goals
- Adapting/Shifting/adjusting behavior when situations change
- Impulse control and delaying gratification
- Modulation of intense emotions
- Inhibiting inappropriate behavior, initiating appropriate behavior
- Simultaneously considering multiple streams of information when faced with complex and challenging information



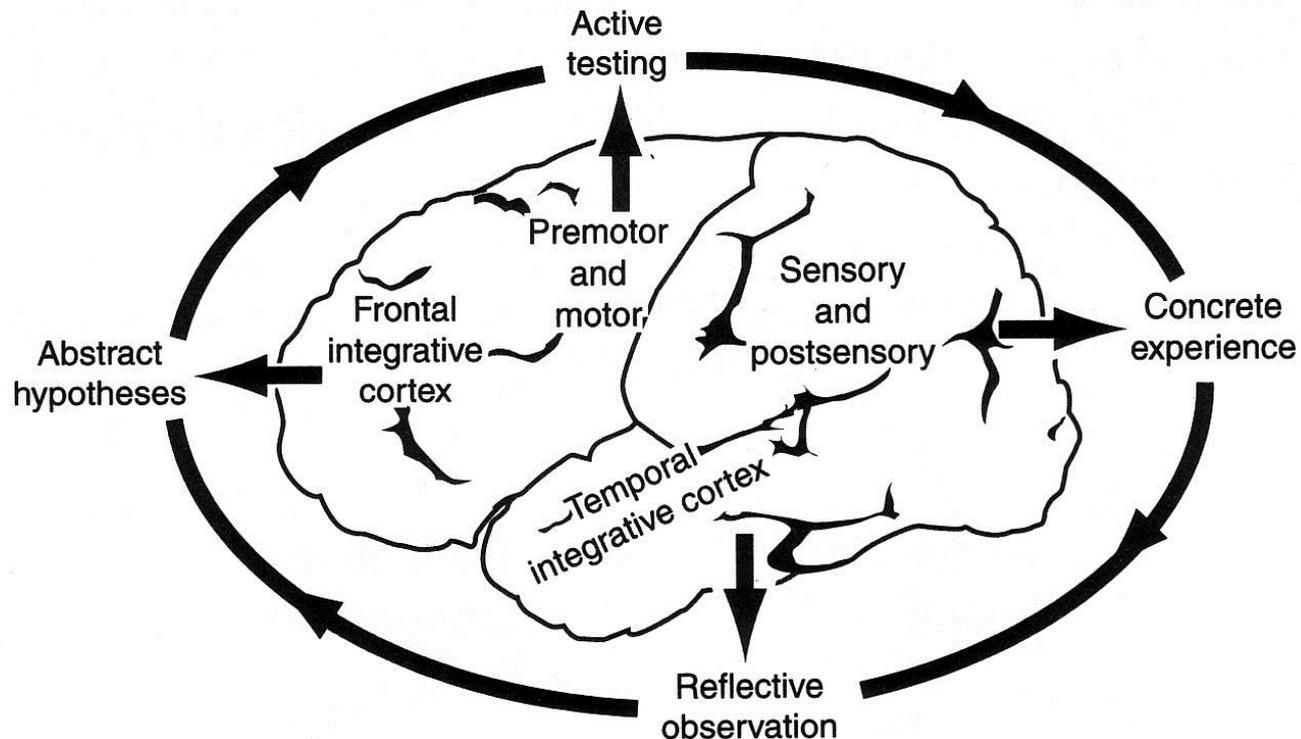
Assessing Prior Knowledge

polleverywhere.com

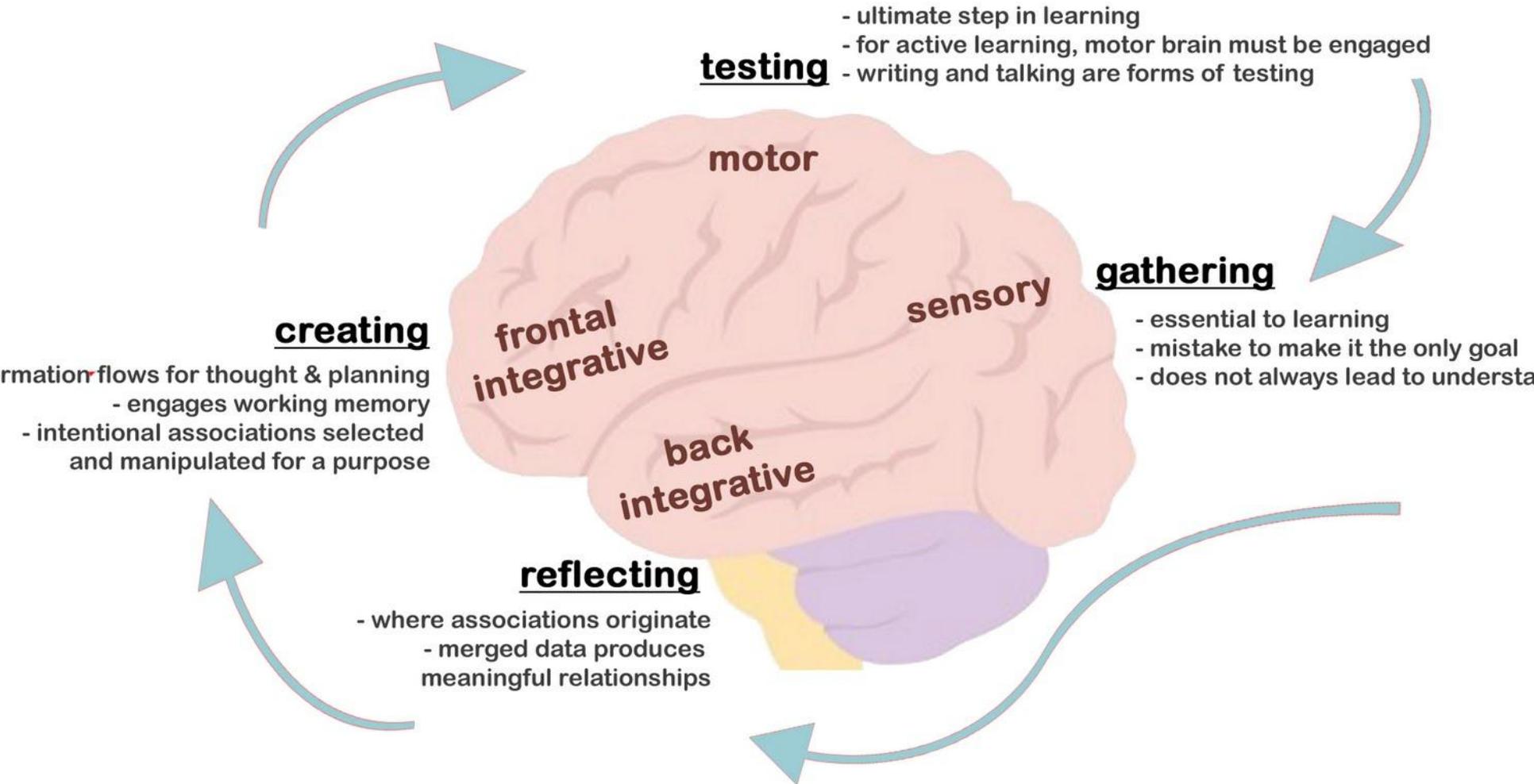


Power of Reflection

- Zull (2002) points out that learning is deepest when it engages the most parts of the brain.
- Deep learning requires activation of all four areas of the cortex
- Learning that consists only of memorizing and regurgitating facts fails to activate the frontal integrative area—remains in the back cortex

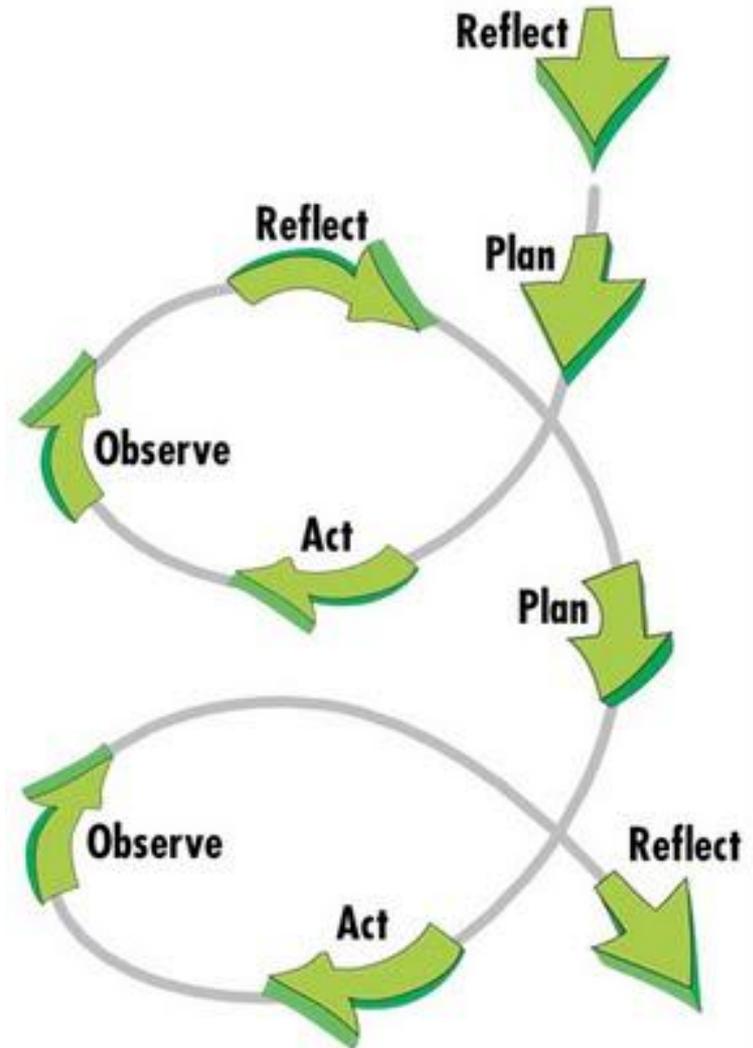


Zull's Model of the Connection Between Brain Function and Human Learning



What is Reflection?

- Thinking by linking recent experiences to earlier ones in order to promote a more complex and interrelated framework of understanding.
- Building Connections, Processing Information
- Looking back on our actions some time after they have taken place



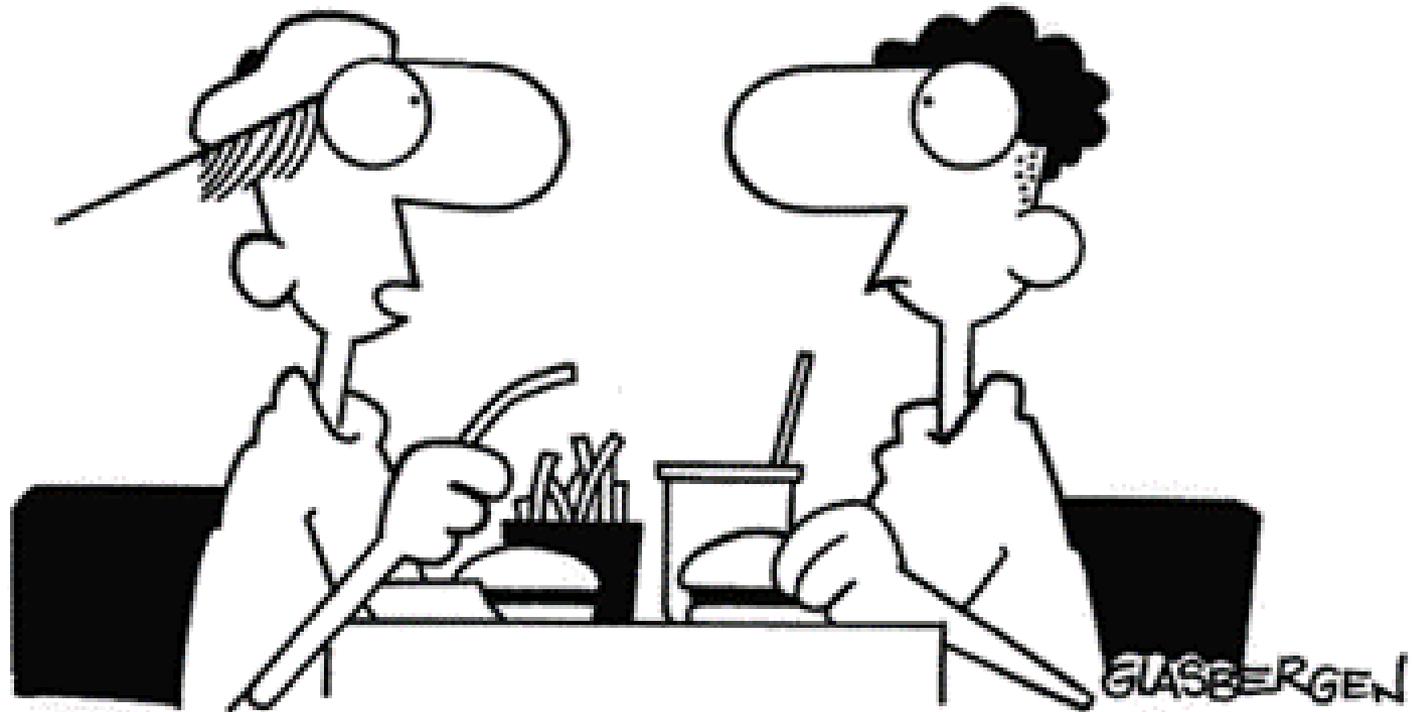
What is Reflection?



- Considering the process of our own learning: **metacognition**.
- **Critical** review of behavior or product.
- Building **theory leading to action based on** observations.
- Engaging in personal or **self assessment**.
- Making **decisions** or resolving **uncertainties**.
- Method of processing information in our own voice
- **Empowering** or emancipating ourselves as individuals.

Really?

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**“I forgot to make a back-up copy of my brain,
so everything I learned last semester was lost.”**

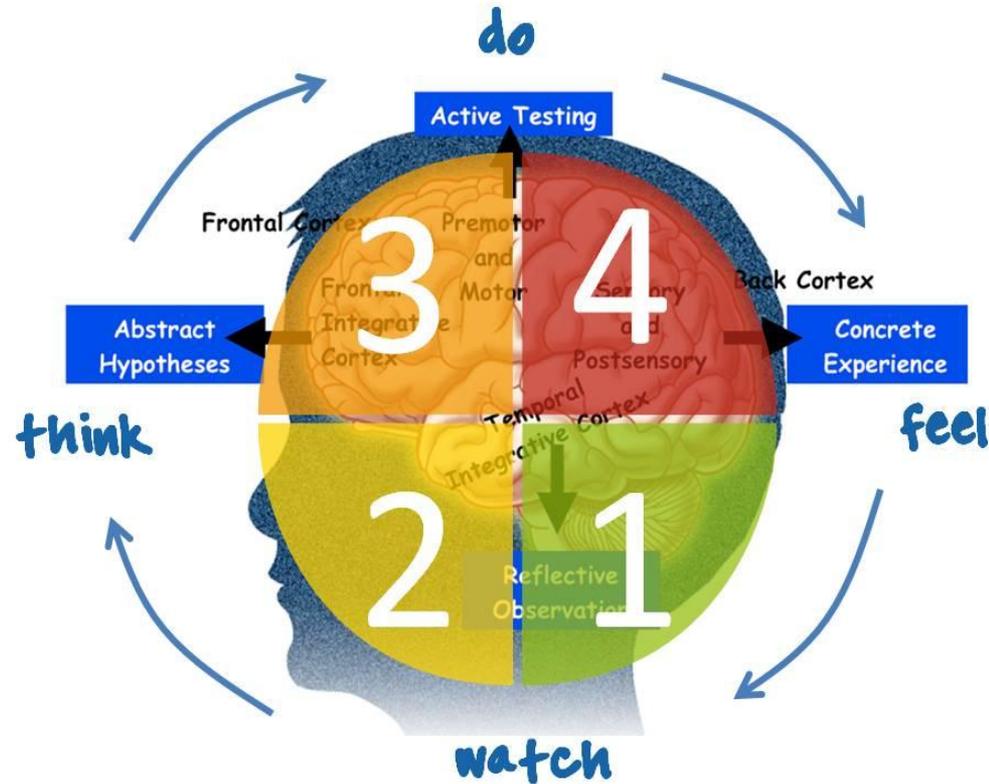
Reflection Activity

- 1) Form two concentric circles with equal numbers of in each circle, or one extra in one of the circles if numbers dictate.
- 2) Form pairs between individuals in the inner circle and individuals in the outer circle (with one triad, if numbers are unequal).
- 3) Show the photos.
- 4) Discuss “What? So What? Now What” format. Allow about 3 minutes for the discussion.



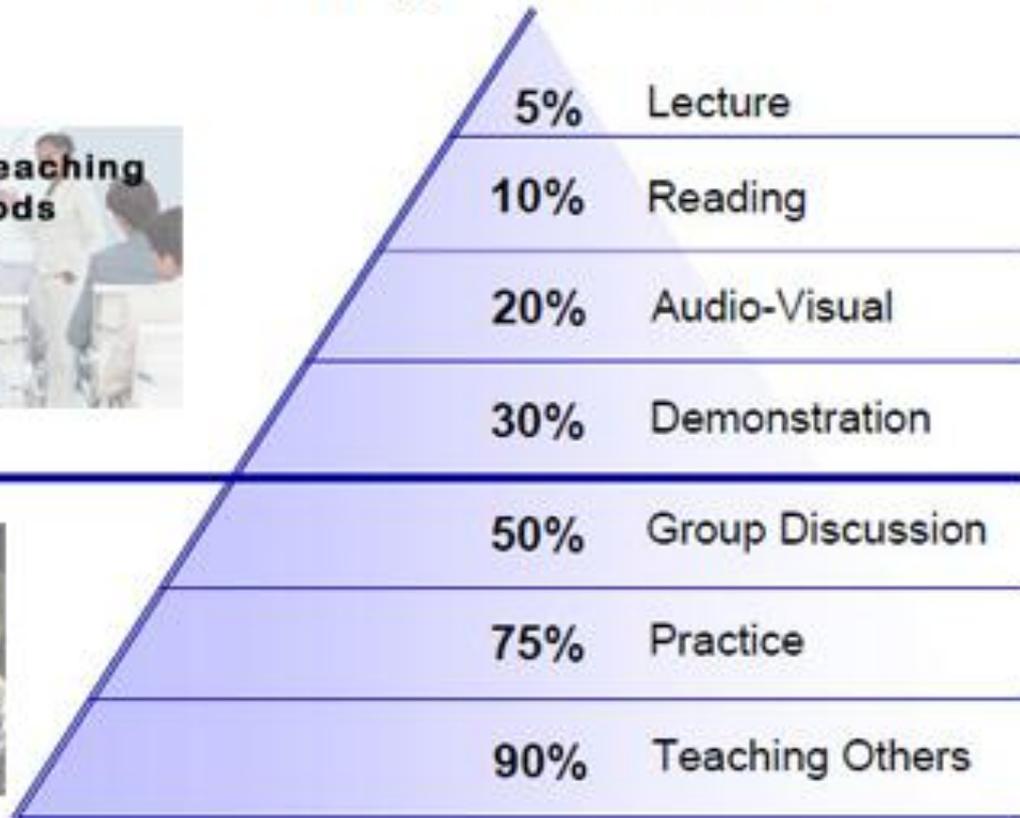
Reflection Activity

- What?
 - **Descriptive**
 - Facts, details, what happened
To whom, with whom
- So what?
 - **Shift from descriptive to interpretive**
 - Meaning of experience for the participants
 - Feelings involved, lessons learned
- Now what?
 - Contextual—see this situation's place in the big picture
 - **How might we apply this model to our teaching?**
 - Apply lessons learned and insights gained to new situations



The Learning Pyramid

Average Retention Rates

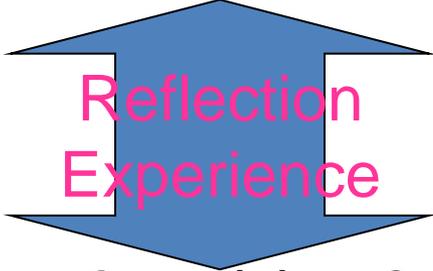


*Adapted from National Training Laboratories. Bethel, Maine

Role of Reflection in “Deep Learning”

Piaget (1971), Kolb (1984), Zull (2002)

Surface Knowledge (“neuronal networks”)

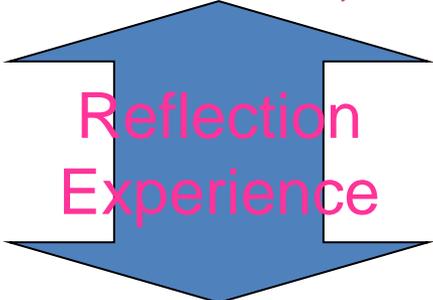


Reflection
Experience

Changing Cognitive Structure

(“conceptualization/experimentation,” “plasticity,” “synaptic connections”)

(Active Learning, Experiential Learning, Problem-Based Learning,
Collaborative/Cooperative/Team-Based Learning, Critical Thinking, Mentoring, Self-
Assessment)



Reflection
Experience

Deep Learning

Reflect!

Think-Pair-Share

- Reflect on a strategy for reflection that you use with students.



- Pair with a colleague and share Your approaches.



- Share with the large group





Types of Reflective Activities

- Journals
- Reflective Essays
- Oral Reflection
- Reading Reflections
 - What is the main point of the reading?
 - What information did you find surprising? Why?
 - What did you find confusing? Why?
- Electronic Forums, Blogs, Wikis, Discussion Boards
- Digital Storytelling, iMovies, Podcasts
- Exit Cards, One Minute Papers, Muddy Points
- Portfolios and E-Portfolios:
3 Types
 - Documentation
 - Process
 - Showcase

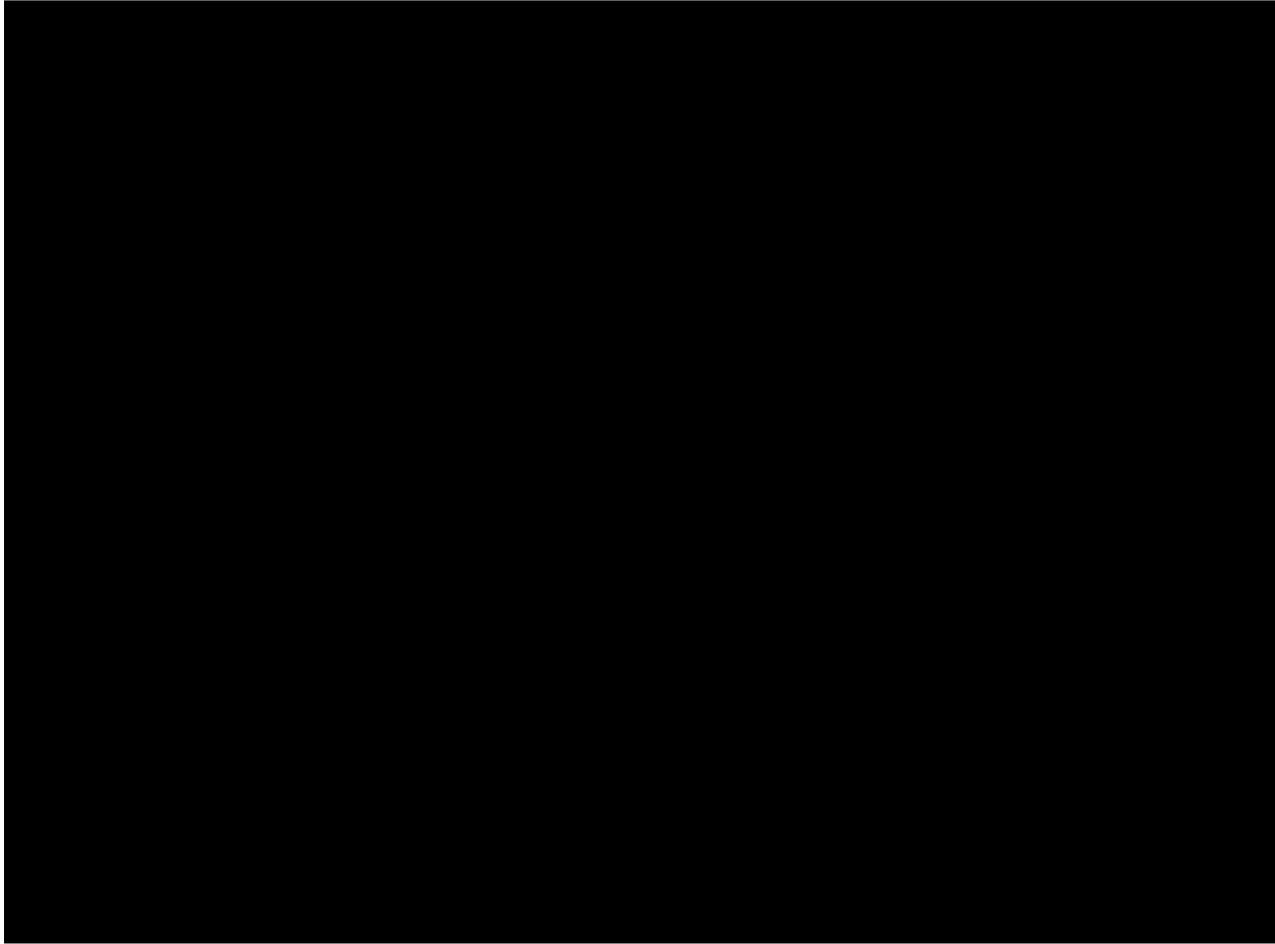
Digital Storytelling Example

- <http://vimeo.com/27423355>
- <http://www.youtube.com/watch?v=IBGzlllx05s>

Download PhotoStory3:

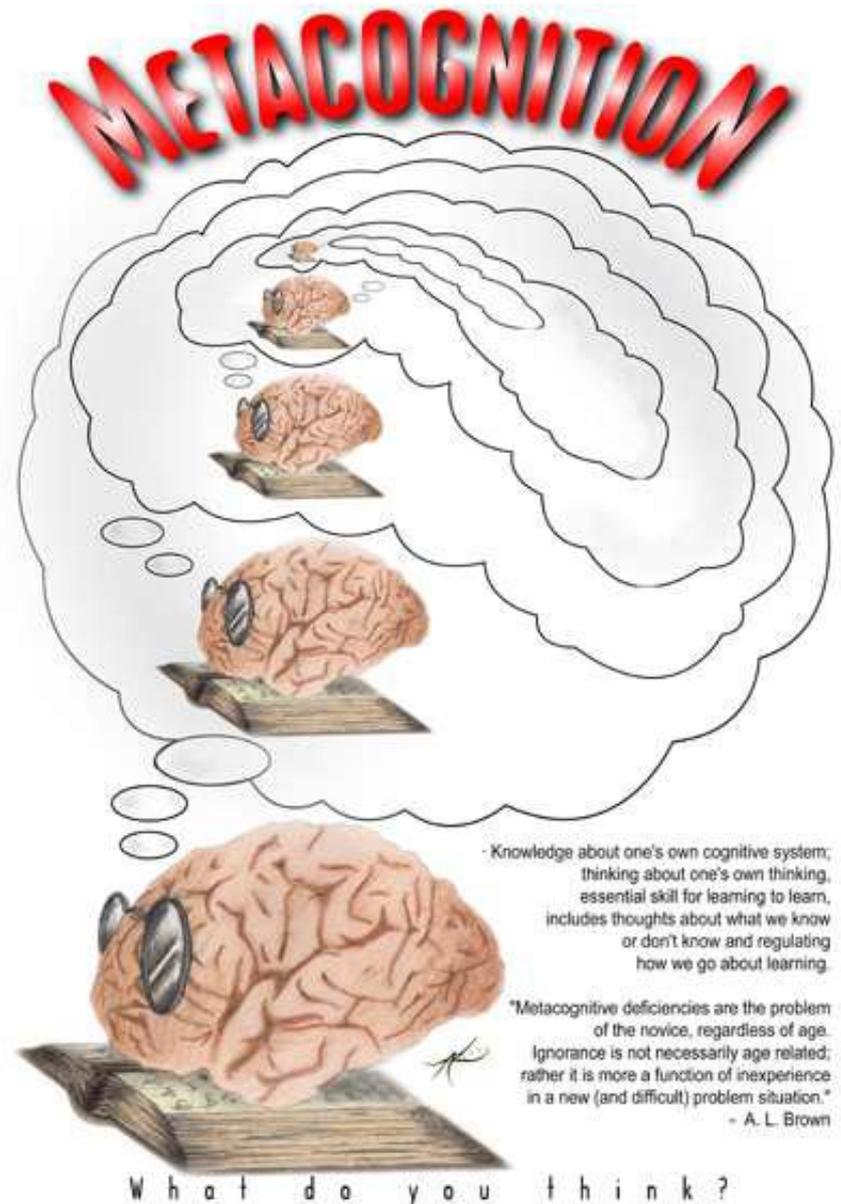
<http://www.microsoft.com/download/en/details.aspx?id=11132>

Your Personal Context at USAFA



Metacognition is...

- a habit of mind through which we think about thinking
- is the ability of learners to be aware of, monitor, and evaluate their learning processes
- Metacognitive includes two skills:
 - *self-assessment*
 - *self-management*



What is Agency?

- “taking responsibility for and assuming active ownership of their own educational and life choices.” (Gummer, 2010)
- "the satisfying power to take meaningful action and see the results of our decisions and choices" (Murray, as cited in Kramsch, A'Ness, & Lam, 2000, p. 97).
- Self-awareness, self-regulation, metacognition (thinking about our own thinking), a “sense of self”
- Includes to ability to evaluate information critically, to form one’s own judgments
- Developing one’s own voice and a belief about ability to control an event
- Goal-directed energy, purposeful action



Adult Trait Hope Scale

- Cognitive Model of Hope; 2 Components
- "a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy), and (b) pathways (planning to meet goals)" (Snyder, et al., 1991, p. 287).



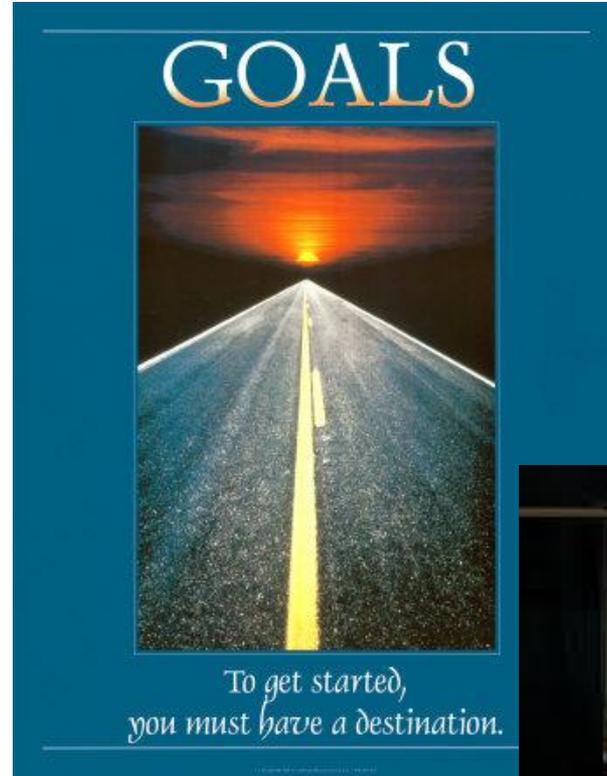
Adult Trait Hope Scale

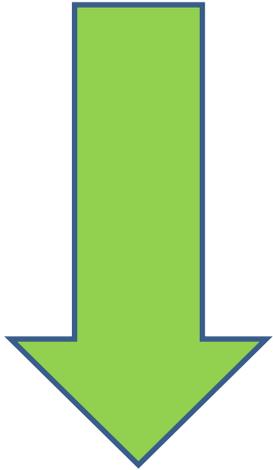
- 12-item, 8-point Likert-type response instrument ranging from *definitely false* (1) to *definitely true* (8)
- Four items assessing Pathways
- Four items assessing Agency
- Four items serving as distracters



Adult Trait Hope Agency Examples

- I energetically pursue my goals.
- My past experiences have prepared me well for my future.
- I meet the goals that I have set for myself.





Declining Levels of Agency End of the First to End of the Second year of College

All Survey Respondents	Gain Score M	Gain Score SD	t-test	df	<i>p</i>	Cohen's Effect Size, <i>d</i>
HOPE Agency subscale (AGEN)	-.924	3.13	-3.86	170	.000**	0.24

Research Question 1: Significant Findings for Agency, * $p < .05$. ** $p < .001$.



Why Hope Matters?

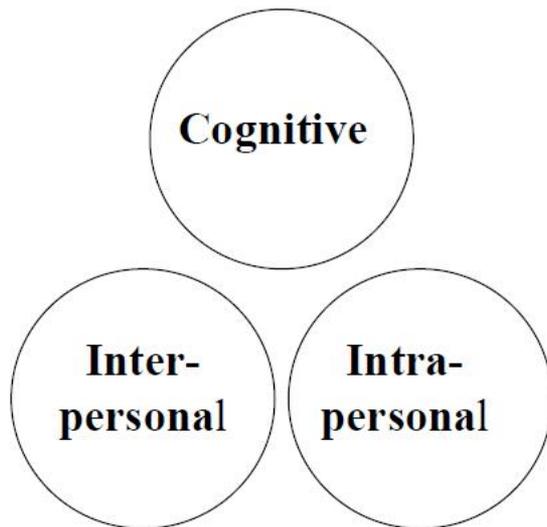


- Higher Hope positively related higher levels of student achievement and engagement
- Hope is positively related to self-efficacy, coping, problem solving, and self-actualization
 - Self-actualization is a “movement toward full human potential” including being “open to new experience, having a trust in themselves, an internal source of evaluation rather than through others, and a direction toward continued growth” (Sumerlin, 1997, p. 1108).

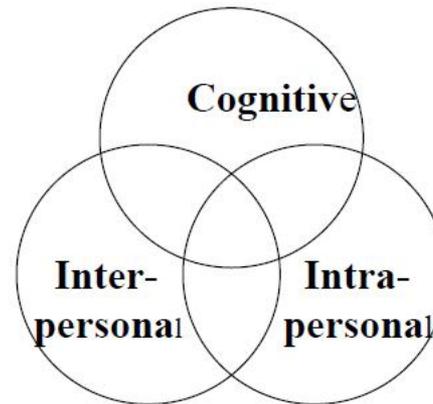
Why Does Agency Matter?

Holistic View of Development

Separate Domains



Related Domains



Integrated Domains

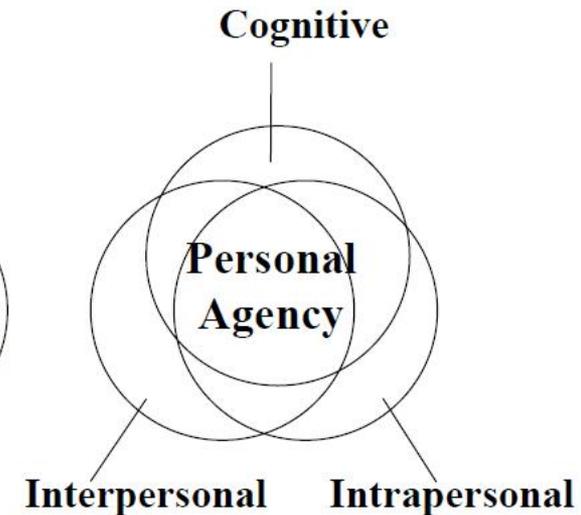


Figure 2. Separate, Related and Integrated Perspectives on Domains of Development.

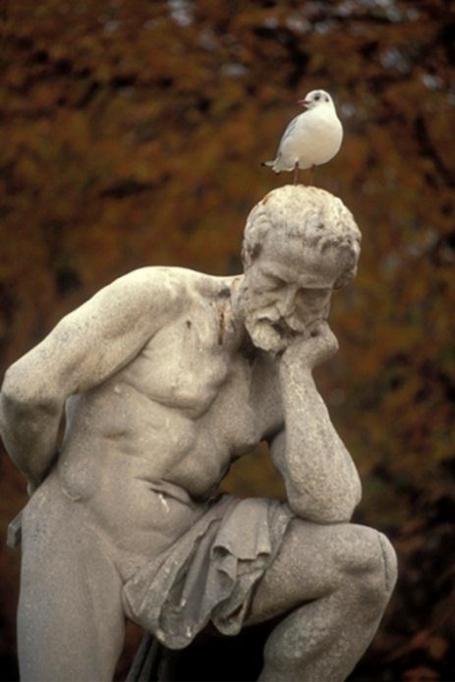
King, P. M., & Baxter Magolda, M. B. (2002). Toward a developmental model of intercultural maturity: an holistic approach to collegiate to collegiate education. In C. Rust (Ed.), *Improving student learning: Vol. 10. Improving student learning theory and practice – 10 years on* (pp. 269-284). Oxford: The Oxford Centre for Staff & Learning Development.



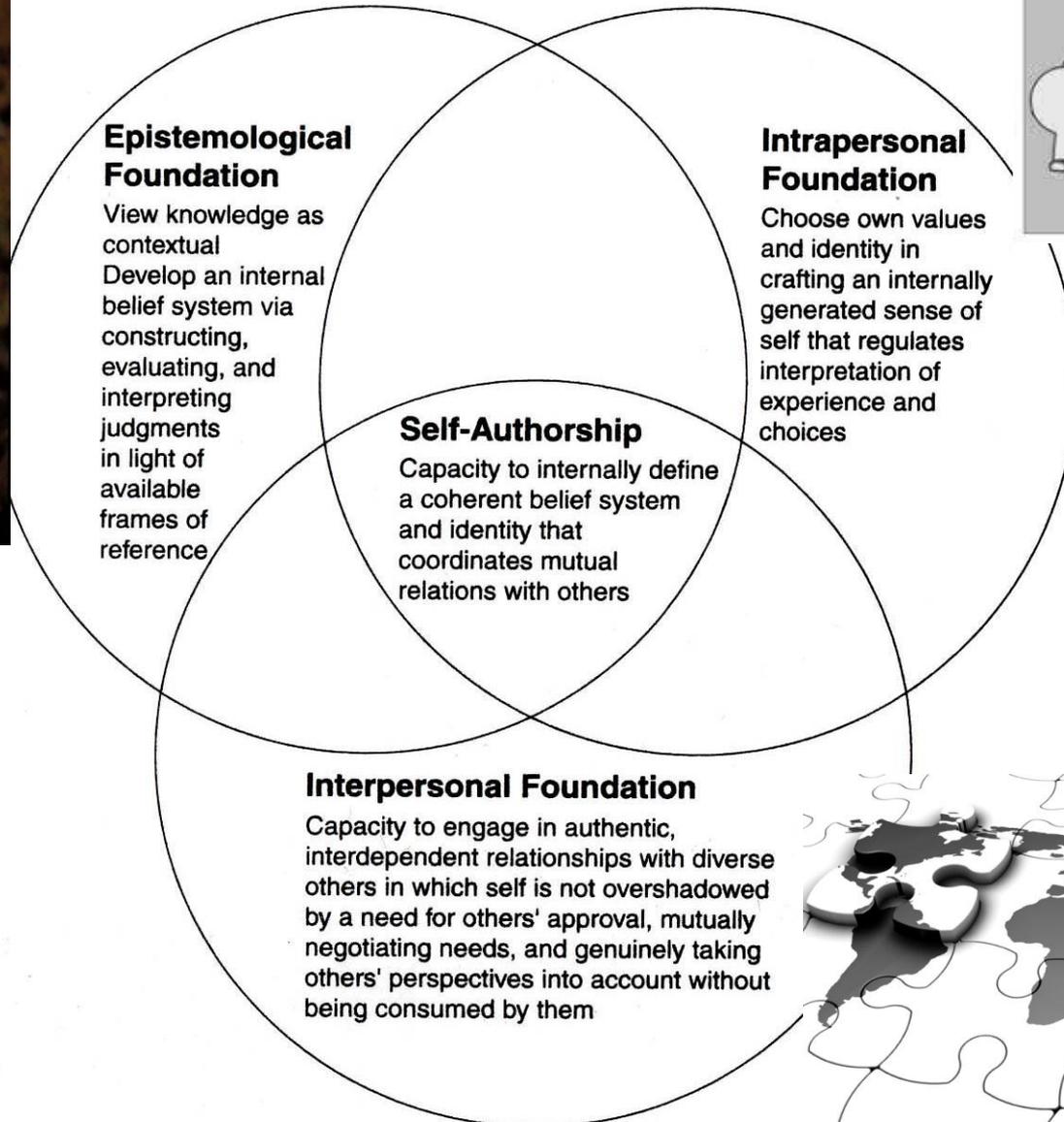
What is Self-Authorship?



- The ability “to construct knowledge in a contextual world, an ability to construct an internal identity separate from external influences, and an ability to engage in relationships without losing one’s internal identity” (Baxter Magolda, 1999, p. 2).
- Students who self-author consider multiple perspectives, reflect on their goals, and make decisions based on internally defined goals and perspectives (Baxter Magolda, 2001; Kegan, 1994).



How do I know?

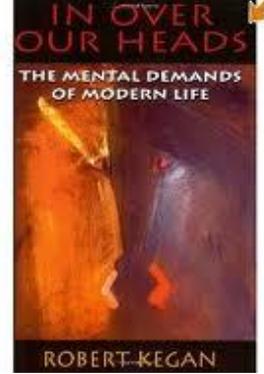


Who am I?



“How do I want to construct relationships with others?”

Why is Self-Authorship Important?



- Mental Demands of Modern Life, Kegan (1994)
 - “Taking on adult responsibilities, managing one’s own life effectively, and making informed decisions as a member of a community requires something beyond learning particular skills and acquiring particular behaviors.” (Baxter Magolda, 1998, p.143).
- Calls from various agencies and the public for measures of student learning outcomes including:
 - Autonomy, respect for others, problem-solving, responsible citizenship
- Self-Authorship, a holistic model “stands at the core of the contemporary college outcomes” (Baxter Magolda & King, 2004, p. 29)
- Reality: Students are leaving college without the ability to self-author

Journey toward Self-Authorship: From Externally Focused to Internally Focused



Epistemological Development Models



Perry (1970)	Belenky, et. al (1984)	Baxter Magolda (1992)
	<i>Silence:</i> characterized by little awareness and by belief that only external authorities know.	
<i>Dualism:</i> world viewed in absolute either-or terms; truth is assumed to be known; info is processed into one of two categories (right/wrong, good/bad, etc); authorities hold truth, so rely on authorities/experts instead of one's own ideas; tasks that require thinking about options or many points of view are confusing.	<i>Received Knowing:</i> knowledge comes from "experts" and authority figures; truth is absolute, concrete, factual (good/bad, right/wrong, true/false); learners receive knowledge from authorities; listening/observing is a way to learn; learner not source of learning.	<i>Absolute Knowing:</i> knowledge is certain or absolute; obtained from authority (instructor); instructor's role is to communicate knowledge appropriately, ensure students understand it; evaluation used as a tool to show teacher what students learned; content emphasized; teacher-centered.
<i>Multiplicity:</i> more tolerance for diverse viewpoints but temporary in areas where <i>Authority</i> "hasn't found <i>The Answer</i> yet;" questions can legitimately have multiple answers; those who hold different beliefs are no longer seen as simply "wrong;" unable to adequately evaluate points of view, and question the legitimacy of doing so.	<i>Subjective Knowing:</i> begin to develop unique vision of world; look inside self for knowledge; truth comes from firsthand experience, from intuition; everyone has right to own opinion - all opinions equally valid; there is no absolute authority; actively explore opinions, new sense of autonomy; can hold contradictory beliefs.	<i>Transitional Knowing:</i> knowledge is partially certain/partially uncertain; students' role is to understand (less emphasis on acquiring knowledge); students expected to take more responsibility; application emphasized; evaluation focuses on student understanding of material.
<i>Relativism:</i> knowledge is relative; uncertainty replaces absolutism; begin to have more faith in own experiences and ideas; begin to differentiate between an unconsidered belief and a considered judgment; <i>Authorities</i> are no longer resisted, but can be valued for their expertise; differing perspectives are not merely acknowledged, but seen as pieces of a larger whole.	<i>Procedural Knowing:</i> describes two forms: separate focuses on evaluating/judging different points of view, is abstract and analytic; focus is on proving, disproving, convincing (objectivism); connected focuses on others' experiences/reality; is narrative, holistic, objectivism achieved through other's perspective; goal is to understand and be understood (constructivism).	<i>Independent Knowing:</i> knowledge is uncertain - everyone has his/her own beliefs; independent thinking is valued - goal is to get students to think for themselves and to promote independent thinking; peers serve as a source of knowledge; teaching more student-centered.
<i>Relativism in Commitment:</i> knowledge and authorities are viewed in much the same way, but students have deliberately - through critical reflection - chosen a particular viewpoint, value, or belief as their own. The difference between this position and the Dualistic position is that the Committed Relativism recognizes that other perspectives may have validity; differing viewpoints are tolerated as long as such	<i>Constructed Knowing:</i> integration of knowledge gained from external and internal sources (personal experience and procedural knowledge); emotion and intellect are viewed as unified whole; knowledge is contextual - answers vary due to context in which the question is asked; self and others are on a joint journey to discover/construct knowledge - competence, not role, defines authority.	<i>Contextual Knowing:</i> knowledge judged on basis of evidence in context; instructor promotes application of knowledge in context but also evaluative discussion of perspectives; emphasis on exchanging and comparing ideas, thinking through problems, integrating/applying knowledge.

Self-Authorship requires...

- ...**transformational learning [DEEP LEARNING]** that helps students “learn to negotiate and act on [their] own purposes, values, feelings, and meanings rather than those [they] have uncritically assimilated from others” (Mezirow 2000, 8).

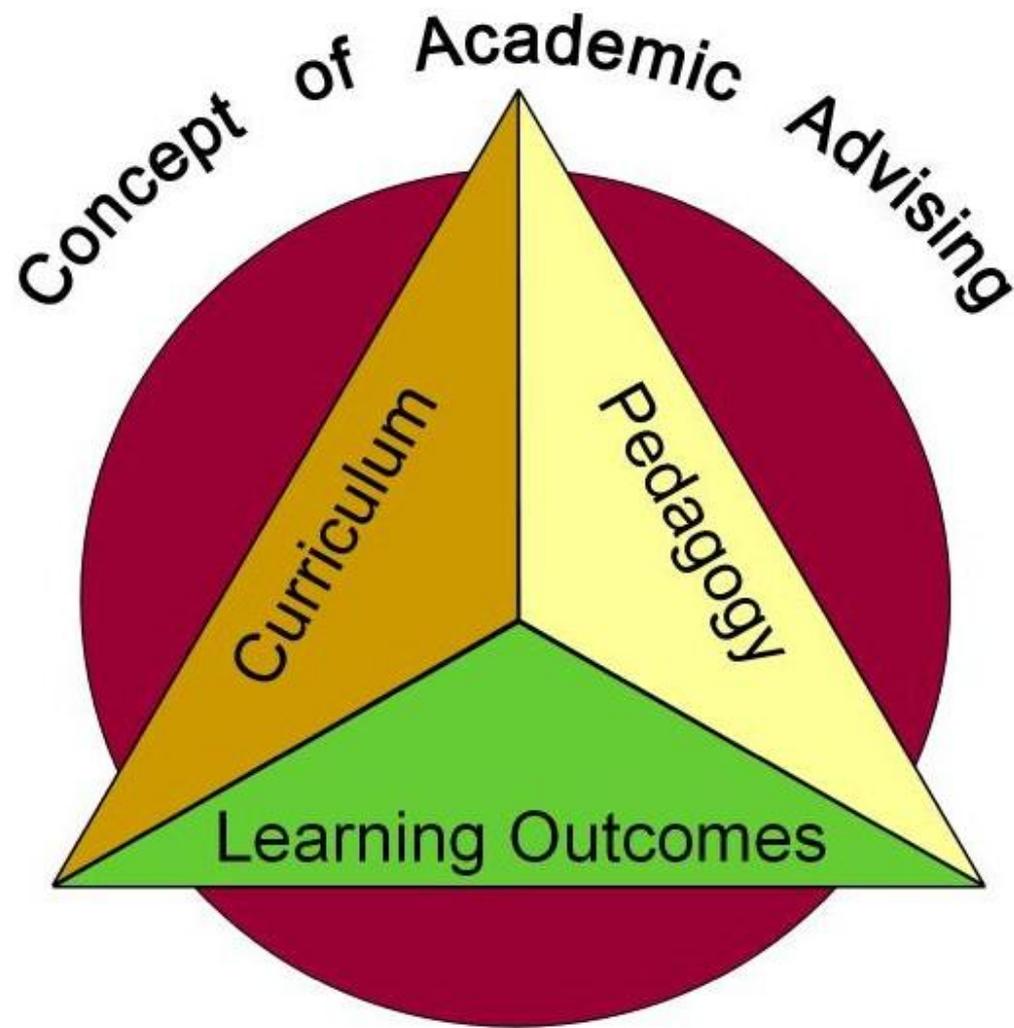


What we really want is...



- “An evolving, growing learner who can...
 - engage with the world of ideas and learn from experience
 - examine and challenge assumptions
 - arrive at commitments through self-reflection
 - relate to others from a place of mutual enhancement rather than need.”

Taylor, K. (1999). Development as separation and connection: finding a balance. *New Directions for Adult and Continuing Education*, Winter, 84, 59-66.



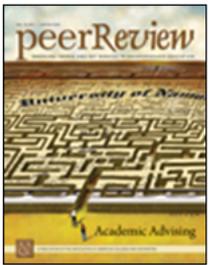
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Winter 2008, Vol. 10, No. 1

Toward Reflective Conversations: An Advising Approach that Promotes Self-Authorship

By Marcia B. Baxter Magolda, distinguished professor of educational leadership, Miami University; and Patricia M. King, professor, Center for the Study of Higher and Postsecondary Education, University of Michigan

[Print Version \(pdf\)](#)

Academic advisers can play a special role in students' lives, as they are in positions to brainstorm possible futures with their advisees and map out paths to get there. In partnership with other faculty and staff, they can use this opportunity to promote students' self-authorship, the capacity to internally generate beliefs, values, identity, and social relations (Baxter Magolda 2001; Kegan 1994). Jane Pizzolato writes that "if students were self-authored, they would be more likely to choose majors that were appropriate and interesting to them, engage in critical thinking about their choices, and develop healthy relationships with diverse others" (2008, 19). Becoming self-authored requires transformational learning that helps students "learn to negotiate and act on [their] own purposes, values, feelings, and meanings rather than those [they] have uncritically assimilated from others" (Mezirow 2000, 8). Unfortunately, most traditional-age college students have not yet developed these capacities, both because many enter college having been socialized to uncritically accept knowledge from authorities (including well-

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WHAT'S NEW



FYE

FIRST YEAR EXPERIENCE

Closing the Loop



Let's continue to conversations
tomorrow...

Thanks for inviting me to join you!

Julie Tetley
julie.tetley@usafa.edu

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