

Acknowledgements

Funders

1. NSF - HRD 1246587
2. NIH - K12 HD055929; Rehabilitation Research Career Development Program
3. UF I-Cubed Program

Thanks to
Colleagues, collaborators, students, and participants

grat·i·tude: 

the quality of being thankful;
readiness to show appreciation
for and to return kindness.

Today's roadmap

1. Describe clinical conditions comprising learning disabilities
2. Appreciate clinical approach to understanding and supporting students with LD within a college setting
3. Understand strategies for facilitating student success and reflect on potential applications to your own practice (teaching, mentoring, advising)

Have you worked with a student with a learning or attention difference?

How did it go? What worked well? What might work better in the future?

Learning Disabilities (LD)

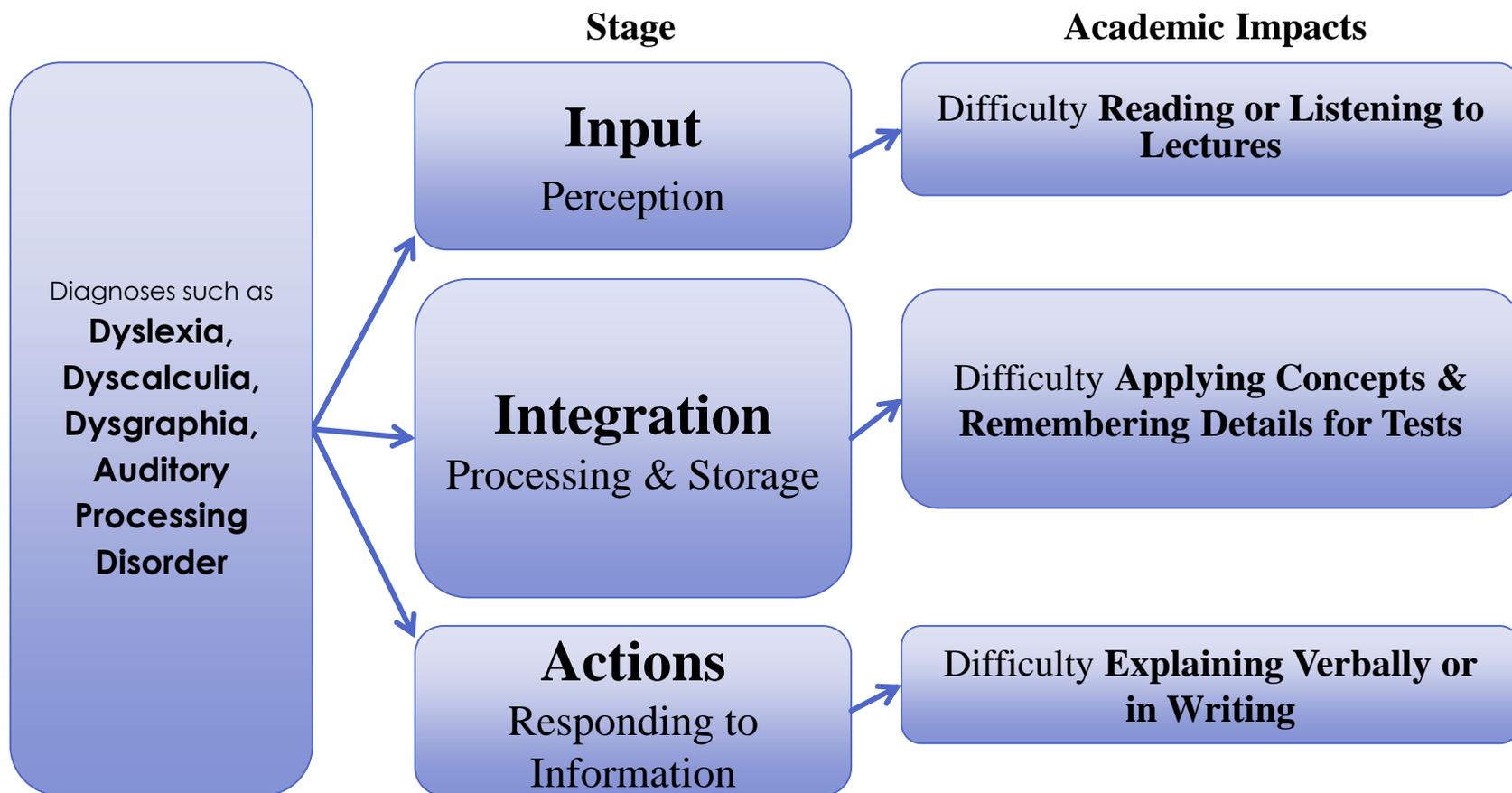


- ▶ Umbrella term – group of developmental disorders that affects the brain's ability to receive, process, store, and respond to information¹
 - ❑ Reading, math, writing disorders
 - ❑ Coordination disorder
 - ❑ Language, auditory processing disorders
 - ❑ Attention disorders (i.e., ADD/ADHD)

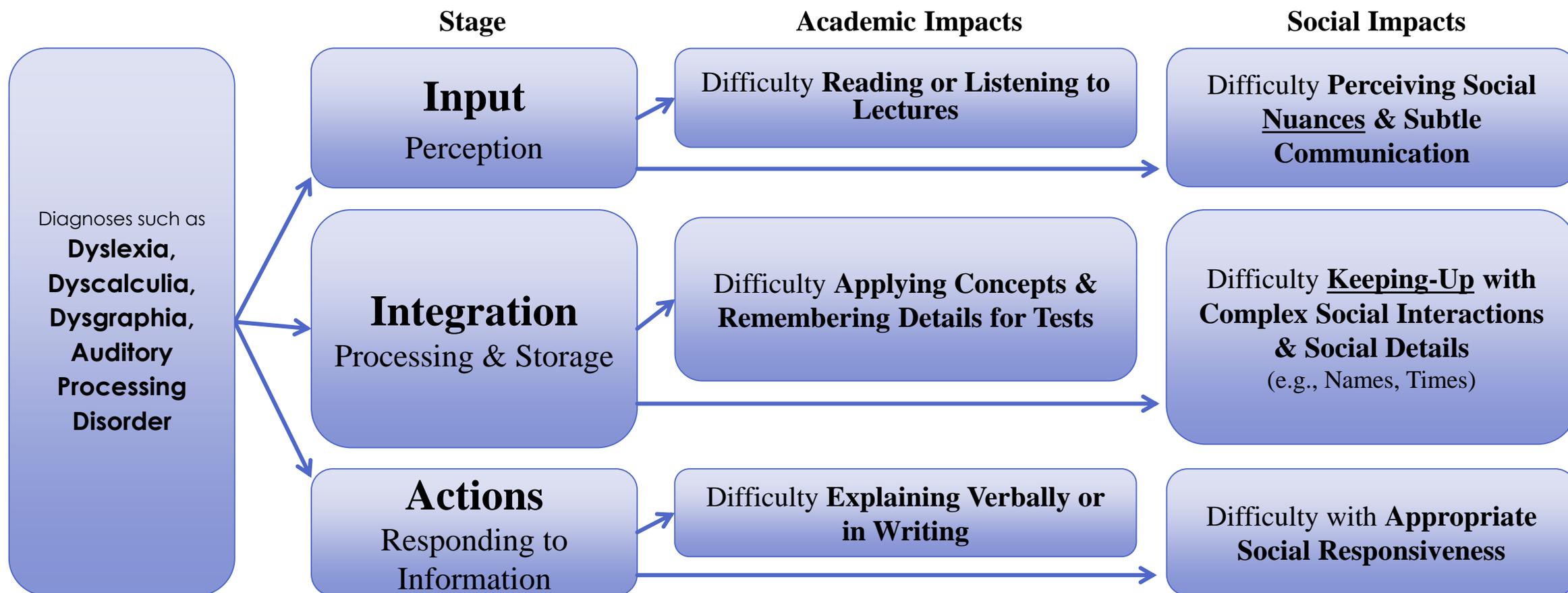
- Academic difficulties despite average or above average intelligence

1. Cortiella, Candace and Horowitz, Sheldon H. The State of Learning Disabilities: Facts, Trends and Emerging Issues. New York: National Center for Learning Disabilities, 2014.

LD Impacts of information processing symptoms



LD Impacts of information processing symptoms



Challenges for Students with LD/AD

- ▶ Often unaware of how their LD symptoms impact their academic and essential life skills¹ – more difficulty with:
 - ▶ Time management; maintaining effective daily routines
 - ▶ Coping with stress; communicating needs
 - ▶ Organizational skills
 - ▶ Problem solving skills
- ▶ Need strong supports; lower self-esteem¹
 - ▶ Often unaware of / under-utilize resources and support services
 - ▶ ↑ Self-efficacy, ↑ academic persistence, ↑ effectiveness of strategy use²



1. Reiff, H., Hatzes, N., Bramel, M., & Gibbon, T. (2001). The Relation of LD and Gender with Emotional Intelligence in College Students. *Journal of Learning Disabilities*, 34(1), 66-78.
2. Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of educational research*, 66(4), 543-578.

Additional Challenges

Receiving / Synthesizing / Applying / Comprehending information & instructions

- ▶ **Concrete language**; word finding/confusion
- ▶ **Slower processing** → difficulty managing assignments within allocated timeframes
- ▶ Communicating and interacting **socially**
- ▶ **Needs a model** - Difficulty applying strategies without a model or experience

Lack of awareness & stigma

- ▶ Instructors being unaware and/or insensitive to needs and challenges
- ▶ “cop-out” excuse, not a real disorder, disruptive, attention-seeking



Learning Disabilities in College

- ▶ LD/AD ~60 % of students reporting a disability¹
 - ▶ 11% of undergraduates estimated to have a disability²
 - ▶ <11% of Students with LD report disability to the college⁴
- ▶ Students with LD
 - ▶ ½ rate (21%) attendance at 4 year college versus general population (40%); 2x rate attendance at 2-year college³
 - ▶ Lower college completion rates: 41% (LD) vs. 52% (general population)³



1. U.S. Department of Education, National Center for Education Statistics. (2015). Digest of Education Statistics, 2013 (2015-011), Chapter 3.
2. <https://nces.ed.gov/fastfacts/display.asp?id=60> retrieved Aug. 11, 2016
3. Cortiella, Candace and Horowitz, Sheldon H. The State of Learning Disabilities: Facts, Trends and Emerging Issues. New York: National Center for Learning Disabilities, 2014.
4. NLTS-2, 2011 : http://www.nlts2.org/data_tables/tables/14/np5S5i_K8g_YNfrm.html retrieved August 11, 2016



Comprehensive Support for STEM Students
with Learning Disability

Project Overview

Comprehensive Support for STEM Students with Learning Disability (CS³LD) is an interdisciplinary research project that is creating, refining, and testing a multi-level model (personal, interpersonal, and institutional) for supporting the success of students with LD majoring in the fields of science, technology, engineering and math (STEM), including social, behavioral and economic (SBE) sciences.

Funded by the National Science Foundation (HRD-1246587), CS³LD brings together faculty members and graduate students in the Colleges of Engineering, Health & Human Performance, Agriculture & Life Sciences, and Public Health & Health Professions to provide comprehensive support through structured mentorship and learning activities.

Watch this short introductory video in which Dr. Consuelo Kreider gives a brief overview of the CS³LD project.

FINAL Kreider Explore Research - CS³LD

I get distracted... silly.

Our undergraduates are working with their graduate student mentors in developing materials that can be...

Also visit CS³LD Objectives, Design, and Team.

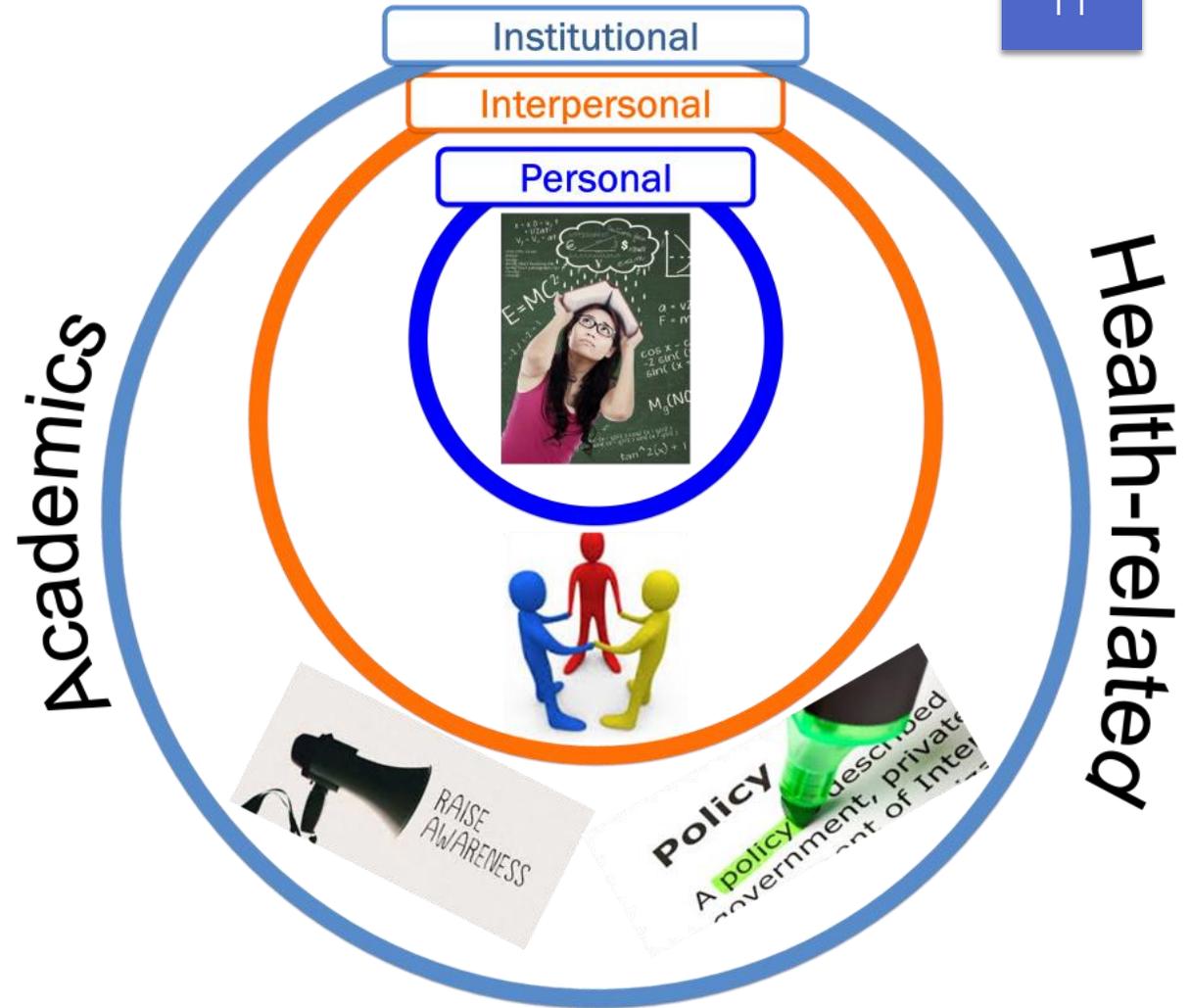
Comprehensive Support for STEM Students with Learning Disabilities (CS³LD)

[HTTP://STEMSCHOLAR.PHP.UFL.EDU/](http://STEMSCHOLAR.PHP.UFL.EDU/)



CS3LD Model for Campus-based Intervention

- ▶ Multi-level supports
- ▶ Holistic supports
 - ▶ Academic supports
 - ▶ Supports for health & wellness



Research purpose & design

Purpose: Develop patient informed rehabilitation interventions for improving developmentally expected functional performance & participation outcomes as informed by

1. Youth themselves
2. Campus stakeholders (providers)

- ▶ **Mixed-methods**
 - Model implementation
- ▶ **Continuous improvement** process
- ▶ **One-group pre- post-**
 - Undergraduate outcomes

Intervention activities

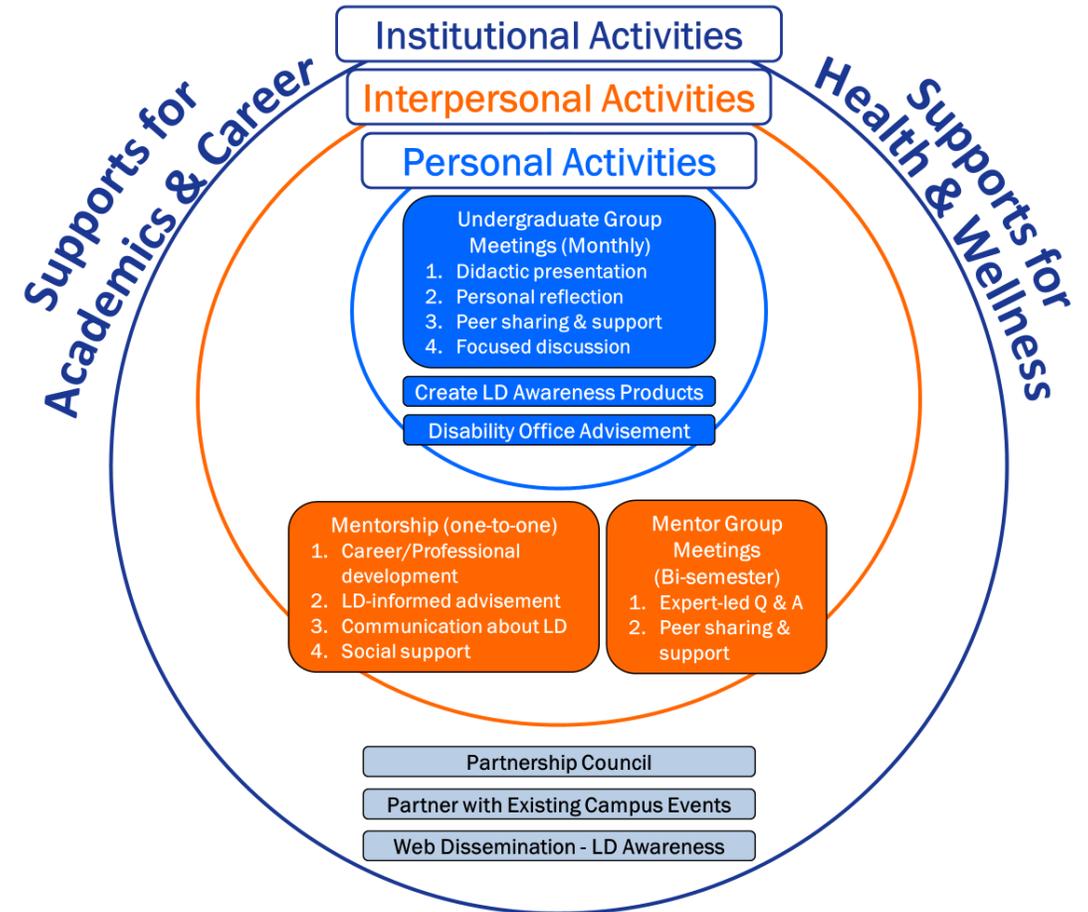
Undergraduate Groups

1:1 Mentorship

LD Awareness Projects

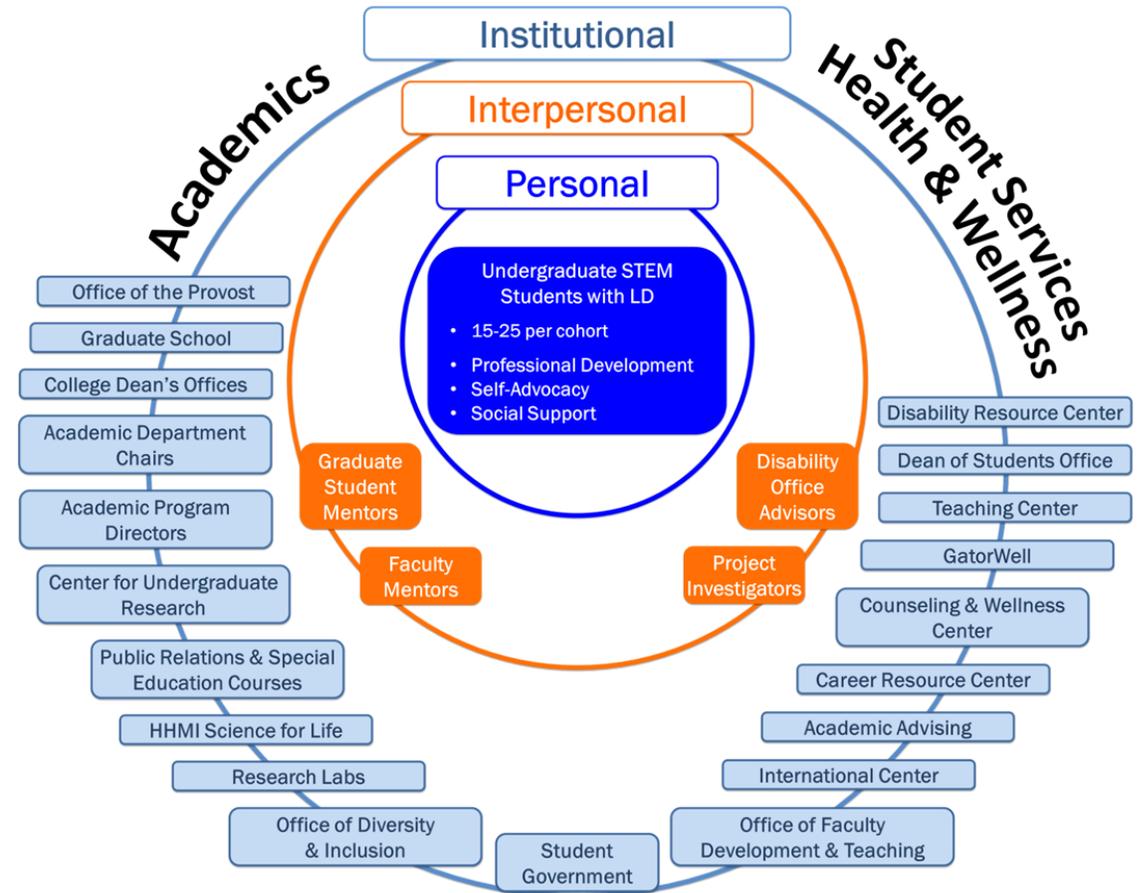
Mentor LD Training & Support

University Council



Setting & sample

- ▶ On UF campus
- ▶ Undergraduates (n=52) Campus disability office
 - ▶ Email listservs, new student orientation, flyers, word of mouth
- ▶ Mentors (n=57 grad students; n=34 faculty mentors)
 - ▶ Grad school & Dept listservs
- ▶ Partnership Council (n=32)
 - ▶ Investigators' networks



Undergraduates' symptoms & functional difficulties

Hints as to **potential classroom difficulties**

Digital visual analogue scale

0 = no difficulty

100 = constant difficulty

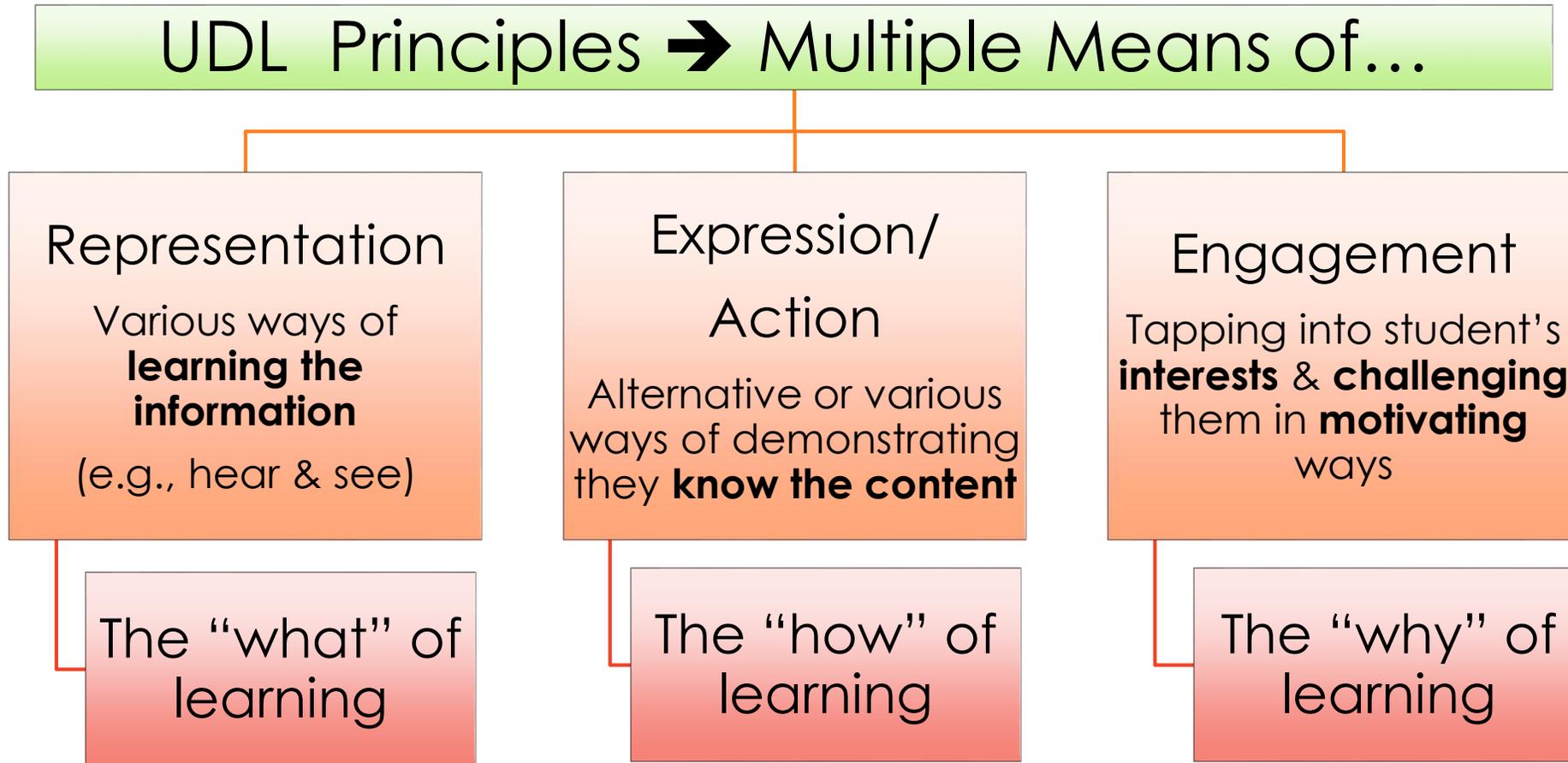
Difficulty with...	Median rating (IQR)
Staying focused	75 (62, 94)
Managing time	65 (50, 81)
Extensive writing assignments	65 (31, 85)
Reading comp. - textbooks/academic publications	64 (50, 81)
Organization	62 (47, 79)
Memorizing/retrieving information from memory	57 (23, 85)
Following multi-step directions	56 (34, 70)
Expressing thoughts or opinions clearly	53 (22, 71)
Following others when they speak in conversation	50 (21, 73)
Applying different approaches to one problem	38 (18, 56)
Initiating activities, tasks, or independent ideas	34 (18, 63)

Lessons from our undergraduates & mentors

Content analyses from
group meeting transcripts
& surveys

HOW CAN WE INTEGRATE
WHAT WE'VE LEARNED INTO
OUR EVERYDAY TEACHING,
MENTORING AND ADVISING
ACTIVITIES?

LD informed Universal Design for Learning



Multiple means
of **representation**:
The “what” of
learning



- ▶ “can you explain this in a different way?”
- ▶ “Recapping at the end of class...”
 - ▶ “...just a real quick recap”
- ▶ “..he just talks, I draw what he says.”
- ▶ “leave it on the board just a little bit longer”

Multiple means of

expression:

The “how” of learning



“Please bear with me...It takes me longer to understand”

“Clear directions, in the right order...and all parts of the instructions in one place”

Multiple means of

engagement:

The “why” of learning



“...not a copout or an excuse”

“I thought I wasn’t good enough for UF”

“I tended to just blame it on myself for being stupid”

“I never procrastinate. I don't trust myself. I do it early.”

Meaningful Discussion Topics to our Scholars

1. Neurology of LD/AD (As a strengths-based approach)

- Cognitive Styles Common To LD/AD^{1,2}
 - Big Picture Thinking
 - Dynamic Reasoning
 - Narrative Reasoning
 - 3-Dimensional Spatial Reasoning

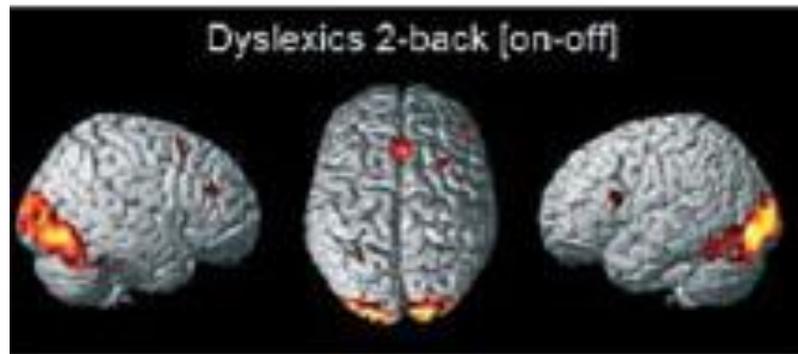
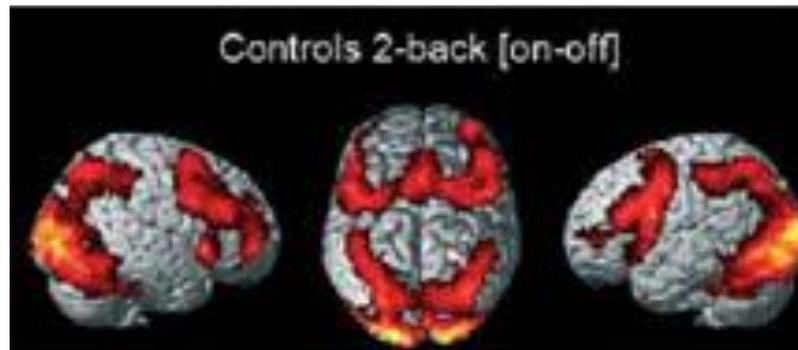
1. Recognize diagnostically-related differences in information processing – that what you are seeing is not behavioral or due to motivational issues
2. Inquire about: study schedules, study strategies, course load (taking on too much?).
3. Encourage distributed practice (small daily study chunks per topic)
4. Suggest Pomodoro technique – 20 minutes deep focus (8-10 min physical break) x 4-6 rounds

1. Eide, B. L., Eide, F. F. (2011) The Dyslexic Advantage Unlocking the Hidden Potential of the Dyslexic Brain. Plume: New York.

2. <http://www.dyslexicadvantage.org/mind-strengths-in-dyslexia-what-are-they/>

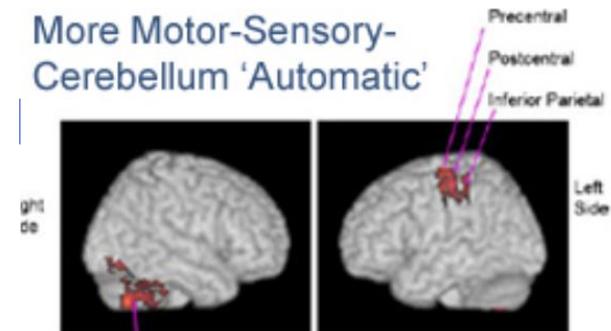
Neural Differences

Dyslexia: ↓
Language
Center
activation

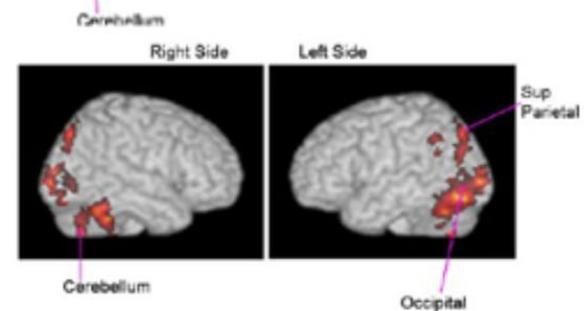


Beneventi et al., Int J Neurisci, 2010

More Motor-Sensory-
Cerebellum 'Automatic'



Good
Writers



Poor
Writers

More Visual Monitoring

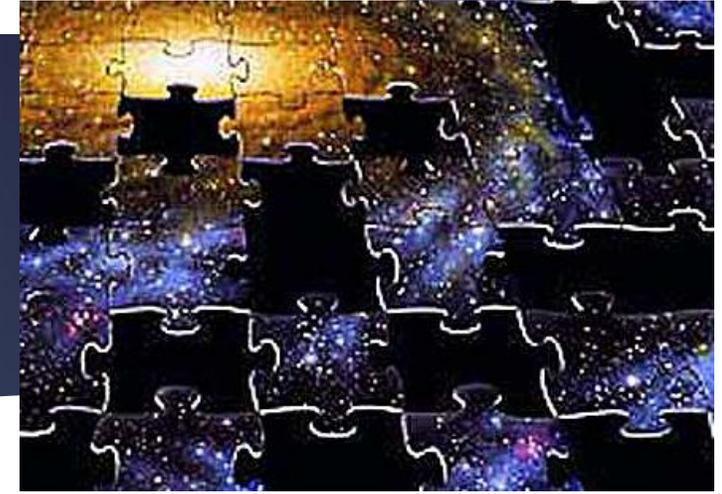
Richards et al., 2011

Big Picture Thinking (Interconnected Reasoning)

- ▶ Ability to spot relationships between different concepts & points of view
 - ▶ multiple points of view
 - ▶ borrows approaches from other disciplines
- ▶ Easily sees relationships of similarities or association/causation
- ▶ Strong conceptual ability



Dynamic Reasoning



- ▶ Ease of spotting similarities and differences
- ▶ Uses the “best fit” cognitive processes
- ▶ Predictions/ simulations based on past events → enables previews of multiple plausible outcomes of various courses of actions
- ▶ Strong innovative thinking
- ▶ Intuits solutions, then works backwards to check potential path(s) to solution
 - ▶ Slower, more difficult discernment of path(s)

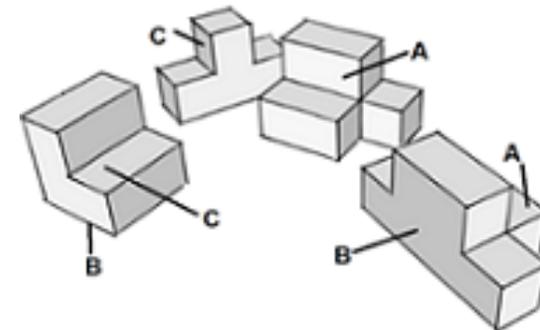
Narrative Reasoning

- ▶ to use stories to recall the past, understand the present and imagine the future



3-D Spatial Reasoning

- ▶ Non-verbal reasoning about:
 - ▶ The shape, size, motion, position of objects in the physical world
 - ▶ Orientation in space
 - ▶ The way objects in physical world interact
- ▶ Spatially gifted → verbally challenged
 - ▶ Arduous to put thoughts into words



Meaningful Discussion Topics to our Scholars (cont.)

2. Time management; understanding temporal organization (e.g., class selection, professional goal setting, extracurricular activity prioritization)
3. Communication about LD
4. Help naming & framing symptoms/needs and personal strengths

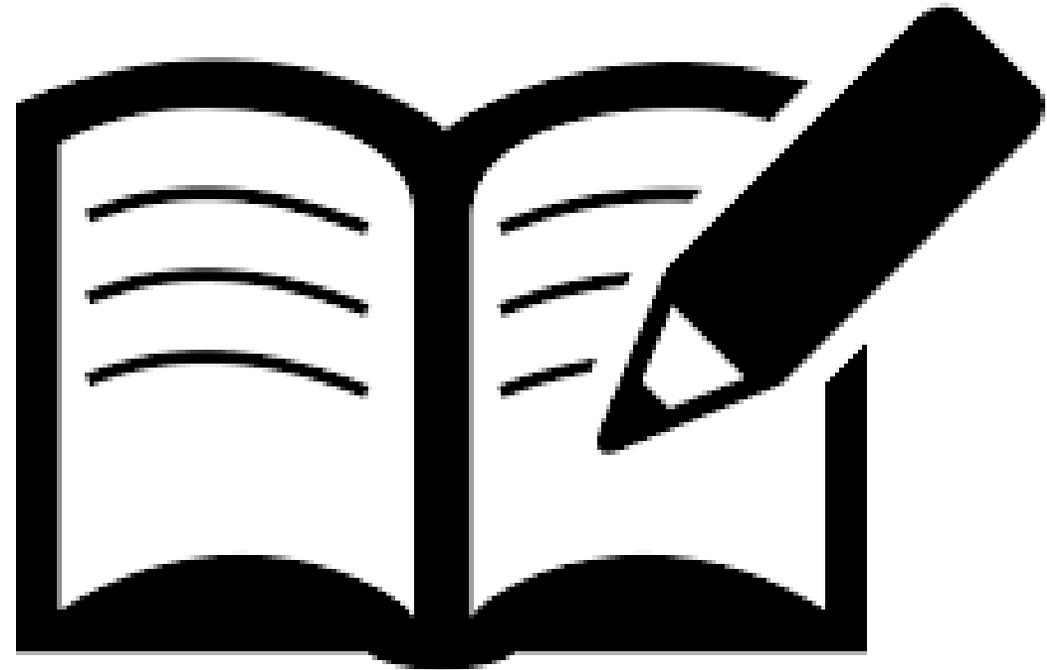
1. Course calendars – critical tools
2. Projects – set intermittent deadlines
3. GatorWell – Time Management coaching

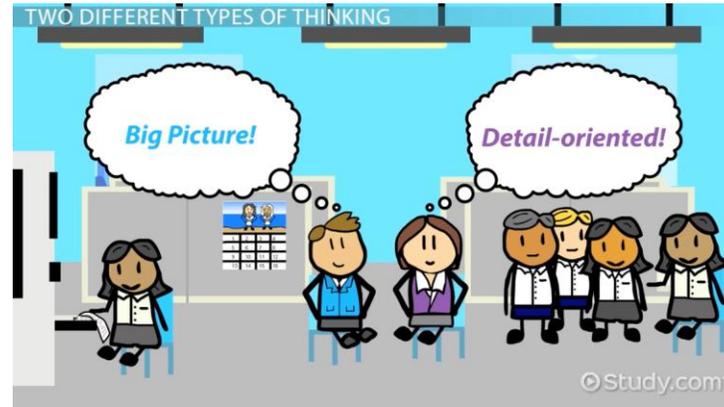
1. “What has worked best for you in the past? What about it worked?”
2. Are there things that I do that are particularly helpful to you? In what ways does it help?

Cognitive Styles

Translations for teaching & advising

1. **Language concerns** (concrete versus inferential language abilities)
 - Tell them explicitly at the beginning of each class period
 - a. What they will learn
 - b. Why they will learn it
 - c. What you expect them to do with the information



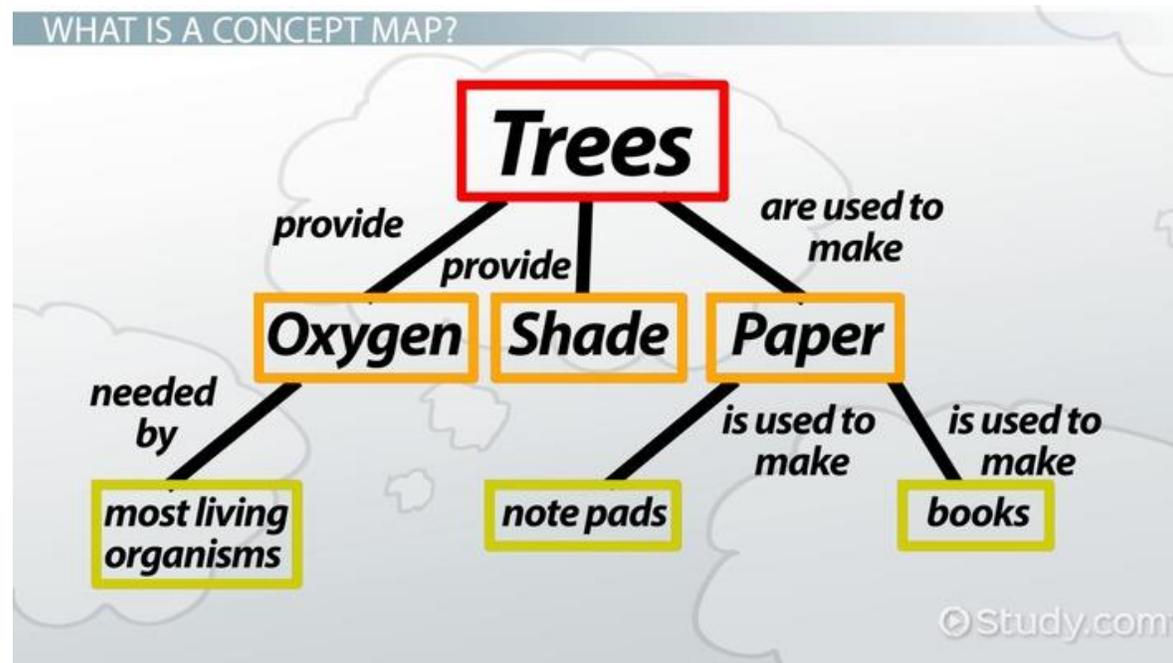


2. Teach to both global big picture and linear detail thinkers

- a. Start and end with the punch line (big picture)
- b. When you spend time on smaller concept, link it back to
 - i. The big picture
 - ii. To the other smaller concepts
 - iii. To concepts learned earlier or to a concept that will be taught later
- c. Use numbering/lists for information that is grouped
- d. Be explicit about what the “take homes” of the day are

3. Facilitate concept mapping

- a. Be explicit and graphic about hierarchical ordering
- b. Situate new “vocabulary” within the concept maps / hierarchies



- 4. Take advantage of narrative strengths – **tell the story** of the content you are teaching

During Lectures

- 1. Highlight: Key terms, Key concepts, Key ideas**
 - ▶ Use visual aids, concept maps, graphs, charts
 - ▶ Don't assume student knows how to correctly read graphs & charts
2. Give the big picture at least twice – beginning and end
 - ▶ At the end, link new concepts back to the big picture and to each other
 - ▶ Spell out the take home points
3. Be explicit
 - ▶ What they will learn. Why learn it. What to do with new learning.
 - ▶ Model reasoning (and how to make judgments) about new ideas
4. Leave things on the board just a little longer
 - ▶ takes longer to write – can't always listen and write at the same time
 - ▶ Takes even longer to write things when they are trying to form visual/conceptual/big picture linkages

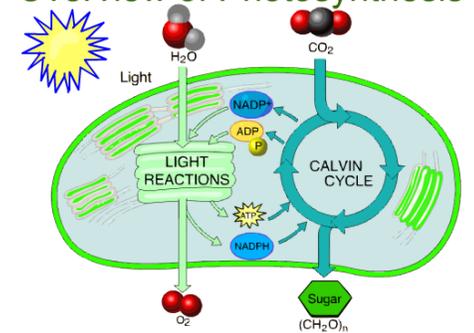


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Overview of Photosynthesis



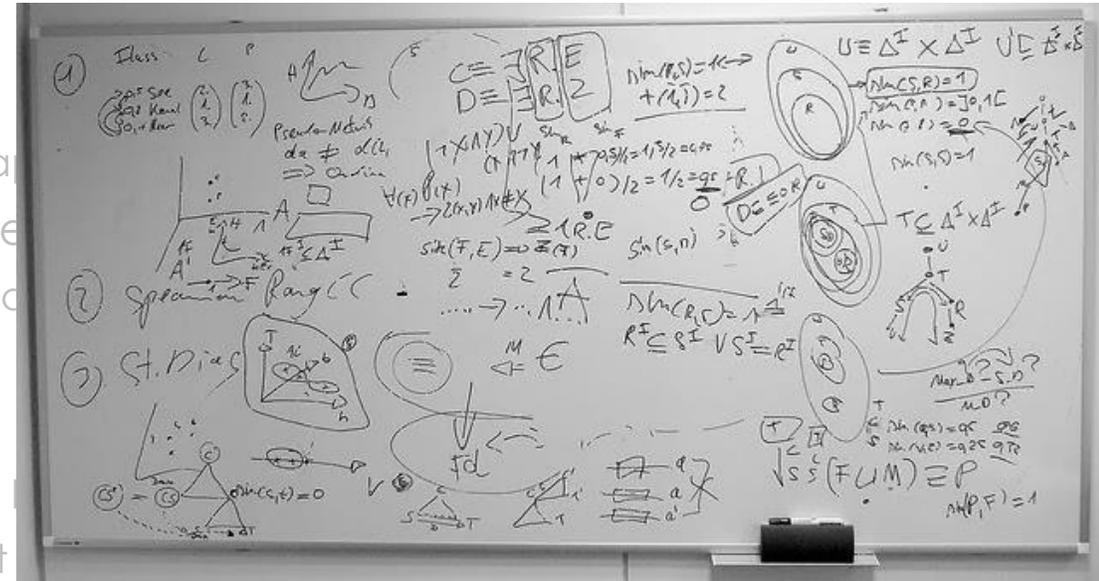
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 - ▶ **What they will learn. Why learn it. What to do with new learning.**
 - ▶ **Model reasoning (and how to make judgments) about new ideas**
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During Lectures

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 - ▶ Use visual aids, concept maps, graphs, charts
 - ▶ Don't assume student knows how to correctly read graphs
2. Give the big picture at least twice – beginning and end
 - ▶ At the end, link new concepts back to the big picture
 - ▶ Spell out the take home points
3. Be explicit
 - ▶ What they will learn. Why learn it. What to do with new concepts
 - ▶ Model reasoning (and how to make judgments) about the model
4. **Leave things on the board just a little longer**
 - ▶ takes longer to write – can't always listen and write at the same time
 - ▶ Takes even longer to write things when they are trying to form visual/conceptual/big picture linkages



General Classroom

1. Provide slides/notes ahead
 - ▶ enables student to preview and create their own “big picture” of the lesson
2. Comprehensive chronological outline: topics, required readings, assignments, exams
 - ▶ All in one location
 - ▶ In order of how they will use/look for the information
3. Clarify instructions & give examples
 - ▶ Provide example of completed project
4. Explain how to study for the kind of tests you give.
 - ▶ Sample test questions & answers

When meeting individually with student, **cue students to:**

1. Relate information to what they already know or a real-life example
2. Use cognitive strategies:
 - ▶ Chunk information
 - ▶ Make concept maps, hierarchies or lists
3. Discern what works, what doesn't, and why
 - ▶ *"What has worked for you in other classes? What's similar or different in this class?"*
 - ▶ *Deep learning as the primary learning strategy?*
4. Make sure student reads using variable ways of reading

Teach a strategy for reading/using textbooks

35

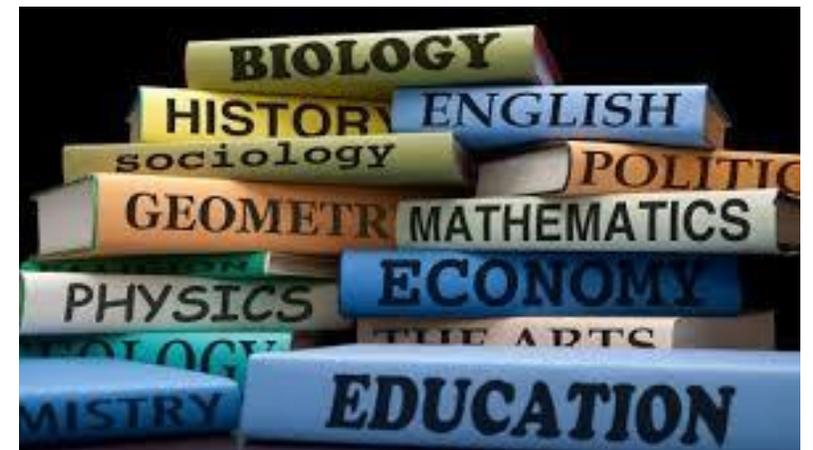
“The 4-pass method” – the advice I give (not tested)

Before class

1. **Identify new words or words *used in a new way*** (10-15 minutes)
2. **Understand the structure of the concepts** from the chapter (10-15 minutes)
 - a. Create hierarchy, outline or concept map of chapter headings
3. **Check understanding of the concepts** (30-45 min)
 - a. “grey boxes”, illustrations
 - b. Against laboratory manual
 - c. Against pre-posted class slides/notes/outline
 - d. During class – verify accuracy of conceptualizations

After class

4. **Read & highlight chapter**





Don't be scary...

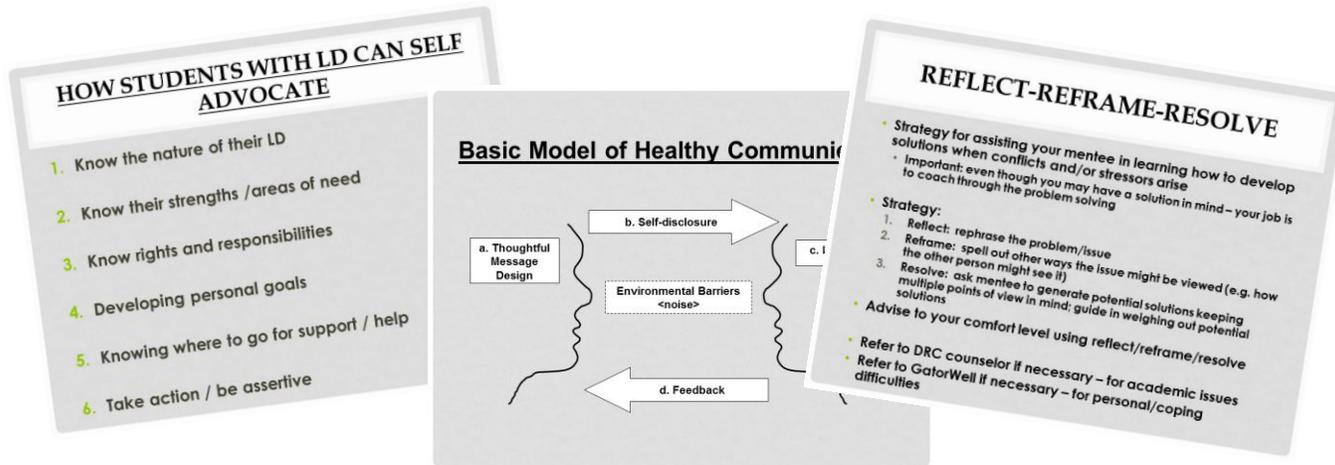
"Kindness is the language which the deaf
can hear
and the blind can see."

Mark Twain

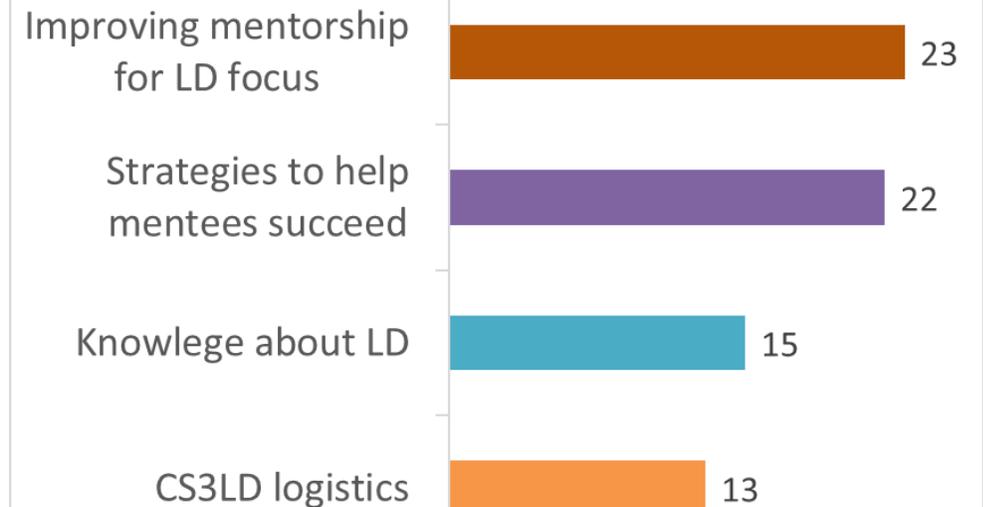
- ▶ Rushed gets mistaken for unapproachable
- ▶ Expectations for getting to the point → *"shuts me down"*
- ▶ Know the rules: No, you're not allowed to ask "Why"
 - Ask: What works for you?

Mentors needed training about LD

Mentor group meetings

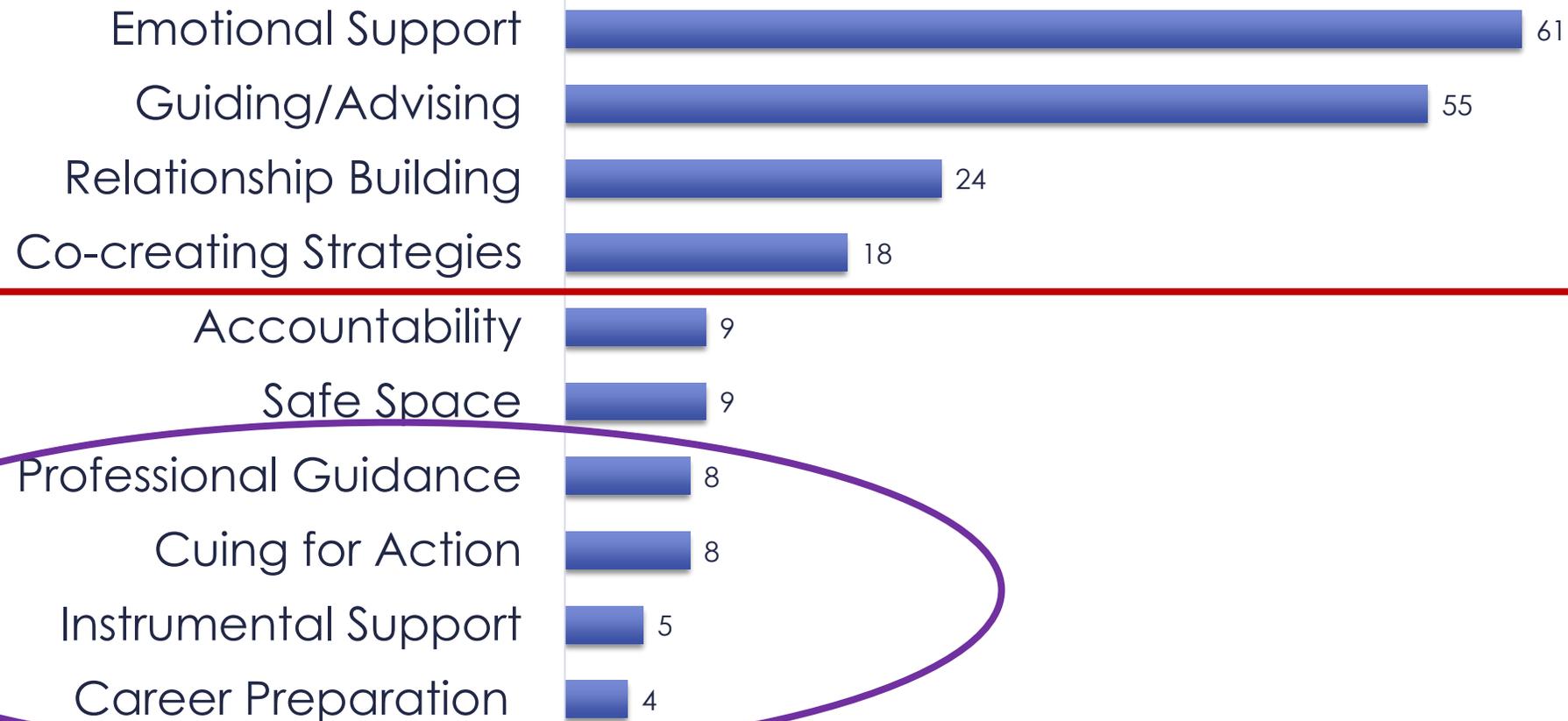


Mentor's Knowledge Needs

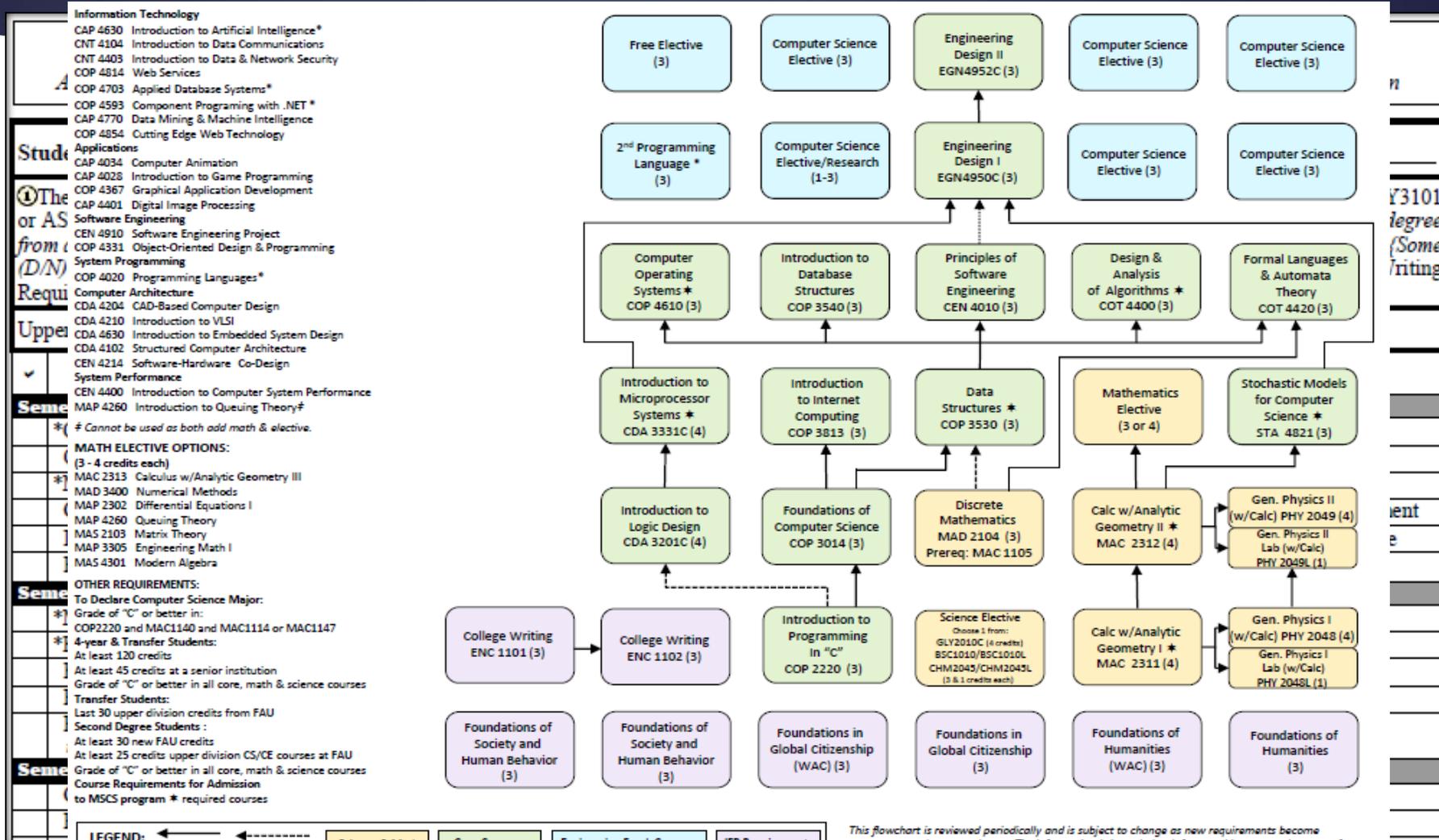


Mentors' roles

What we learned from our mentors:



Lessons for advising



This flowchart is reviewed periodically and is subject to change as new requirements become necessary to educate engineers. The information is intended to inform and is not a replacement for a

LD-informed Tips for advisors & course counselors

1

Ask questions

such as:

- “Are there a particular times of the day in which you are more or less productive?”

2

Know teaching styles for common courses

and learning styles/strategies that pair with them

3

Be knowledgeable about **academic accommodations**

– **what they are & why they help**

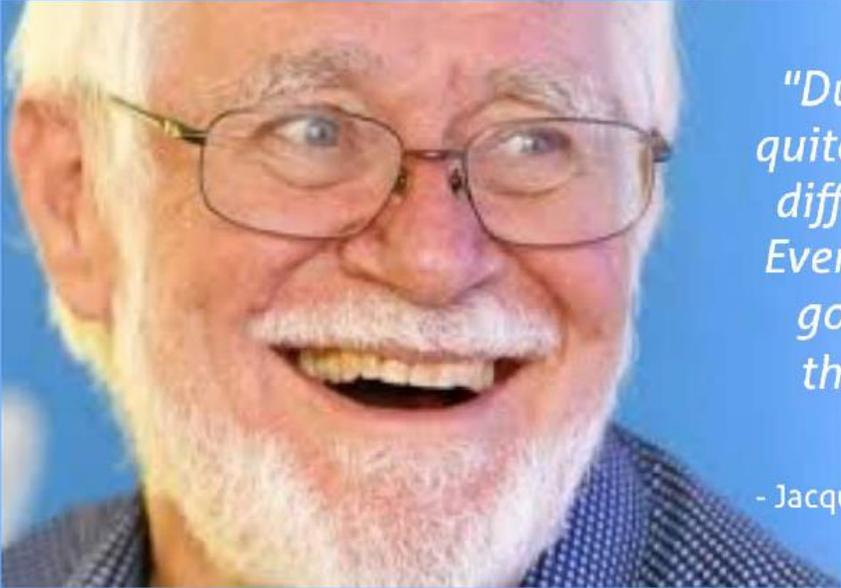
<https://drc.dso.ufl.edu/services/academic-accommodations/>

4

Acknowledge the diversity of experiences brought by each student, increasing chances for **building connections and rapport**

Campus Resources

- ▶ Disability Resource Center
- ▶ Counseling and Wellness
 - ▶ **Biofeedback, problem solving sessions, skill development**
- ▶ GatorWell
 - ▶ **Wellness coaching, stress management techniques, time management coaching**
- ▶ UF Teaching Center & Reading & Writing Center
 - ▶ **Time Management Strategies**
 - ▶ Test Prep and Test Taking Strategies
- ▶ Career Resource Center
 - ▶ **Career best-fit counseling**, interview prep
 - ▶ 1:1 career counseling within DRC



"During my youth, I was quite asocial. I had a lot of difficulty with the world. Every ten years, I found, it got a little better. Now things are going quite well..."

- Jacques Dubochet, 2017 Nobel Prize



**SPEAKING OF POSITIVE DYSLEXIA:
A NEW NOBEL PRIZE WINNER**

Provide
inspiration

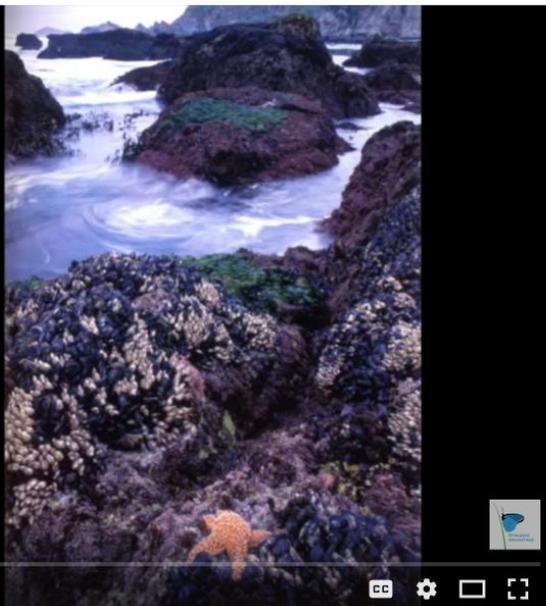
<https://www.youtube.com/watch?v=2gw0OFImhcc>

Subscribe to all videos

I study the physics of
HOW
organisms interact
with their
environment

PUT TOGETHER
DIFFERENT FIELDS:

Biology + Ecology
&
Physics + Engineering



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Dyslexic Advantage - MacArthur Genius Biologist Dr Mimi Koehl

McArthur Genius Awardee
Biologist, Dr. Mimi Koehl

<https://www.youtube.com/watch?v=4mdz88JvYEg>

CS3LD Team – it takes a village



- ▶ Consuelo Kreider, PhD, OTR/L, ckreider@ufl.edu
- ▶ CY Wu, PhD, Environmental Engineering Sciences
- ▶ Sue Percival, PhD, Food Science & Human Nutrition
- ▶ Charles Byrd, PhD, Center for Assessment, Strategic Planning, Evaluation and Research
- ▶ Mei-Fang Lan, PhD, Counseling & Wellness Center
- ▶ Beth Roland, M.A. C.A.G.S., Disability Resource Center
- ▶ William Mann, PhD, OTR/L; Anthony Delisle, PhD; Jim Gorske, MEd; Anthony DeSantis, PhD



Thank you!

QUESTIONS?

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<http://kreiderlab.php.ufl.edu/>

