WELCOME!

QUESTIONS TO PONDER

GRAB THE BLUE AND LAVENDER HANDOUTS AND JOT SOME NOTES!

Think of one course you're currently teaching:

-What are the goals of this course?

-How much freedom do you have as an instructor to shape your course?

-***Is it clear to your students what is most important in your course? Why or why not?***

all session materials available at **biologyprof.com/ubd**

IMPLEMENTING VISION & CHANGE IN YOUR COURSE:

Improving course coherence, assessment, & student engagement using Understanding by Design planning

Julie Minbiole, Ph.D.
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National Association of Biology Teachers
Professional Development Conference - Providence, RI
November 13, 2015

#NABT2015

CHALLENGES FOR INSTRUCTORS

OUR (PARTIAL) LIST

What did you write about in your "questions to ponder?"

What's challenging / frustrating for you in designing and running your courses?

all session materials available at **biologyprof.com/ubd**

CHALLENGES FOR INSTRUCTORS

JULIE'S (PARTIAL) LIST

-teaching high-level understandings

-training in pedagogy?

-building a course based on a course title

-being handed course materials that don't fit

all session materials available at **biologyprof.com/ubd**

CHALLENGES FOR INSTRUCTORS

IMPLEMENTING RECOMMENDATIONS FROM ***VISION & CHANGE***

Core Concepts for Biological Literacy	**Core Competencies** and Disciplinary Practice

all session materials available at **biologyprof.com/ubd**

CHALLENGES FOR INSTRUCTORS

IMPLEMENTING RECOMMENDATIONS FROM "VISION & CHANGE"

Core Concepts for Biological Literacy	**Core Competencies** and Disciplinary Practice
1. Evolution 2. Structure and Function 3. Information Flow, Exchange, and Storage 4. Pathways and transformations of energy & matter 5. Systems	1. Ability to apply the process of science 2. Ability to use quantitative reasoning 3. Ability to use modeling and simulation 4. Ability to tap into the interdisciplinary nature of science 5. Ability to communicate with and collaborate with other disciplines 6. Ability to understand the relationship between science and society

AGENDA

1. Introductions and Framing the problem ✓ [1-1:10pm]
2. Julie's story: Discovering UbD [1:10-1:15pm]
3. Principles of UbD [1:15-1:25pm]
4. Julie's story: Refining course objectives [1:25-1:30pm]
5. ***Work Time!*** Round 1: Course objectives [1:30-1:45pm]
6. K-U-D's as a planning tool [1:45-1:50pm]
7. ***Work Time!*** Round 2: Student objectives & K-U-D's [1:50-2:05pm]
8. Priorities and the "Nestedness Diagram" [2:05-2:10pm]
9. Wrap-up Discussion & Future Work [2:10-2:15pm]

all session materials available at **biologyprof.com/ubd**

YOU WILL LEAVE THIS SESSION WITH…

1. Information & resources about UbD and Backwards Design
2. A concrete tool to improve course planning and assessments
3. One really good test question*

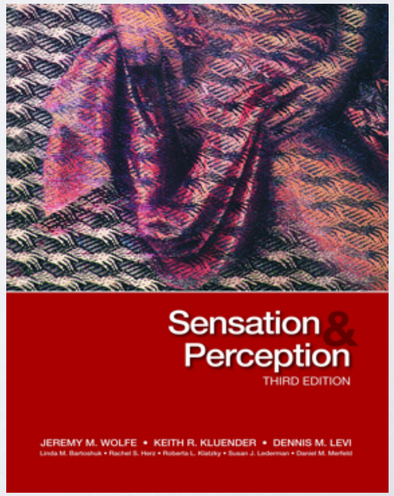
***Note: you have to write said question, but we'll give you time, and a great tool :)**

all session materials available at **biologyprof.com/ubd**

JULIE'S STORY

REALIZING A COURSE I LOVED TO TEACH NEEDED TO BE "FIXED"

Reworking a Sensation & Perception course for Columbia College



SO…HOW DID THAT GO?

- My Thoughts
- Assessments
- Student Evaluations

THERE'S A WORKSHEET FOR THAT?

Yes. There is.

UbD Planning Worksheet

Stage 1--Desired Results

Established Goals:

Students will understand the main functions of the visual cortex.

Understandings:

Students will understand that....

Our knowledge of the brain is limited.

We study or gain further knowledge of S&P using numerous methods.

Damage has consequences for how we interact with our world

Essential Questions:

How can brain damaged individuals help us study or gain further knowledge of Sensation & Perception?

Students will know...

What regions of cortex do what – by straight up memorizing OR by better yet, interpreting damage/test results.

Students will be able to....

Interpret results of an impaired individual's tests.

Stage 2--Assessment Evidence

Performance Tasks:

Read Oliver Sacks "The Man Who Mistook his Wife for a Hat". Identify gaps in physiciansassessment/performance tests. Suggest neuroimaging tests to perform on patient indicating what one each test would help identify. Suggest areas of cortex that might be affected.

Other Evidence:

Be familiar with current brain imaging techniques discussed in class and what information they can provide us with.

Know cortex regions and functions as they pertain to Sensation & Perception.

Stage 3--Learning Plan

Learning Activities:

-Lecture on what's after middle vision - "What vs. Where" pathway in visual system, highlighting cortex regions.

-Class discussion of fMRI images of patient D.F. vs. normal individuals, possible effects?

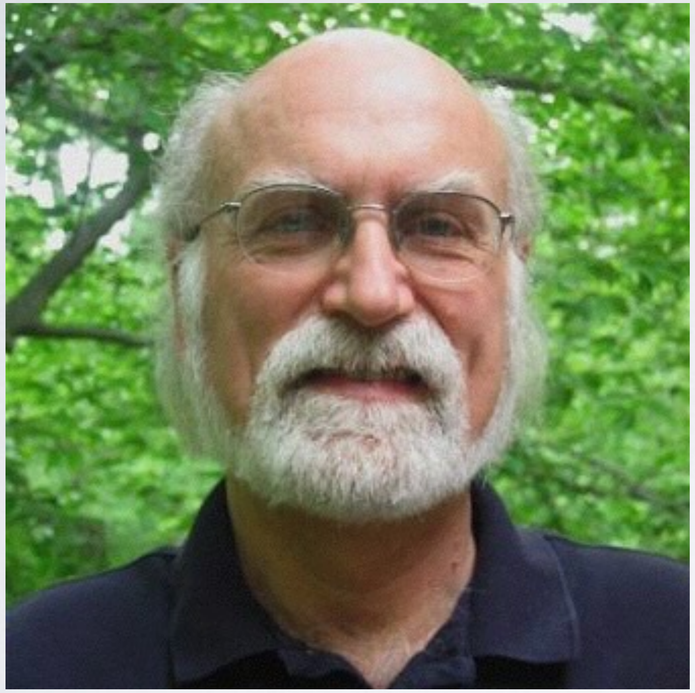
-Class discussion of drawings completed by patient D.F.

-Listen to *All in The Mind* radio interview, Dr. Mel Gooddale on work with patient D.F.

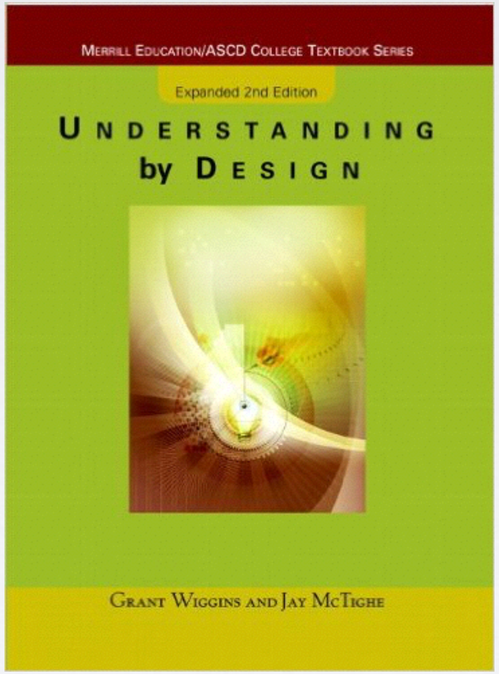
-Expand to excerpts from *Secrets of the Mind*, Dr. VS Ramachandran: Blindsight, Visual Neglect, Capgras Delusion.

Adapated from Wiggins & McTighe, 2005

UNDERSTANDING BY DESIGN (UbD)

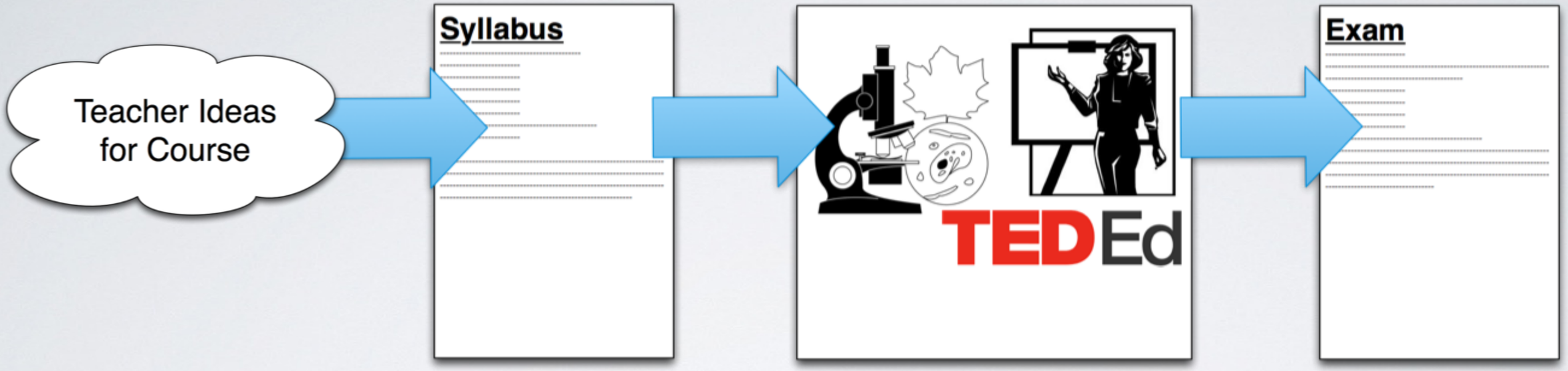


Grant Wiggins



Jay McTighe

TRADITIONAL COURSE PLANNING

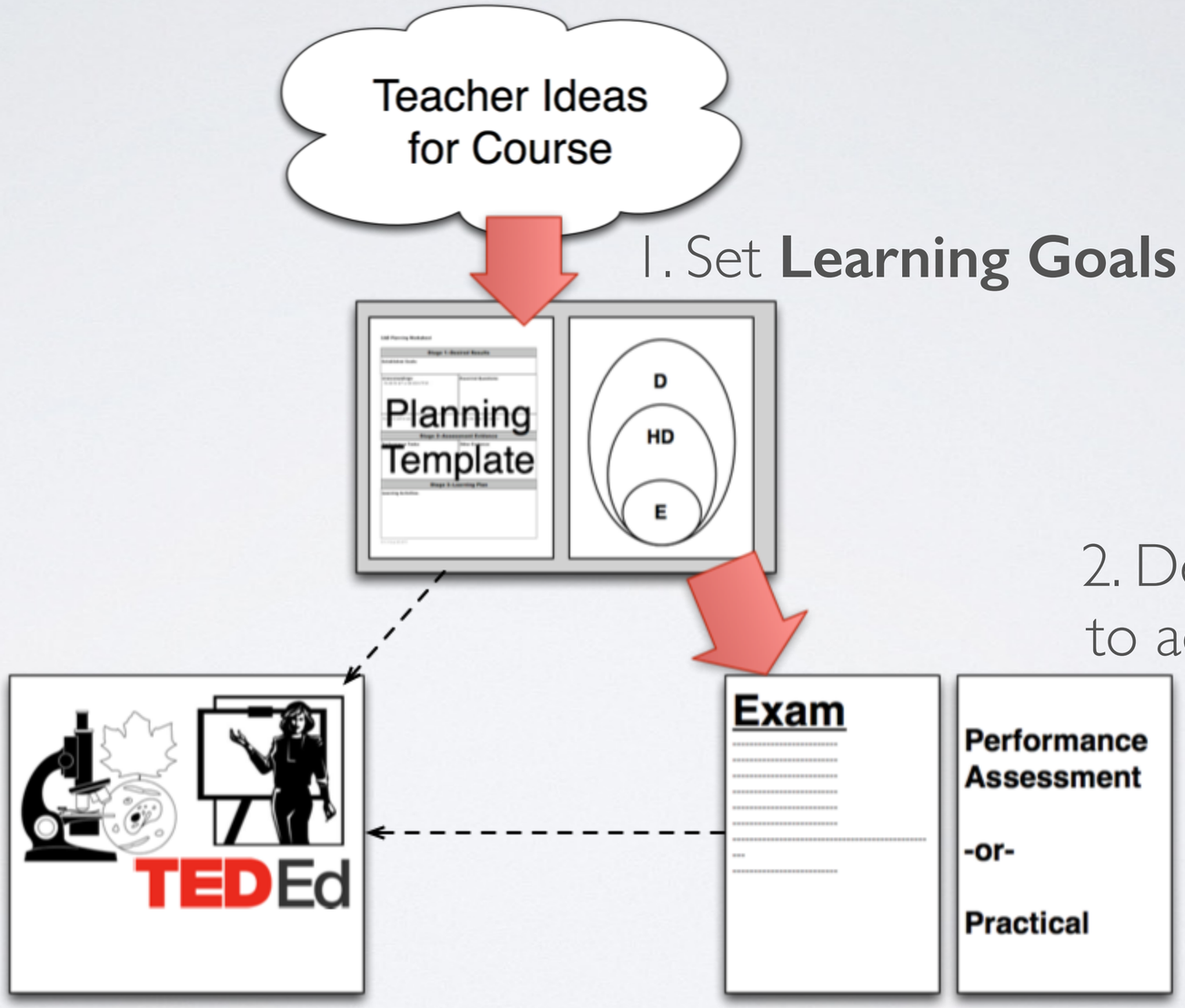


1. Set **Instructional Goals**

2. Choose & Design **Instructional Materials**

3. Design **Assessments** to match Instructional Materials and Goals

BACKWARDS DESIGN PLANNING



1. Set **Learning Goals**

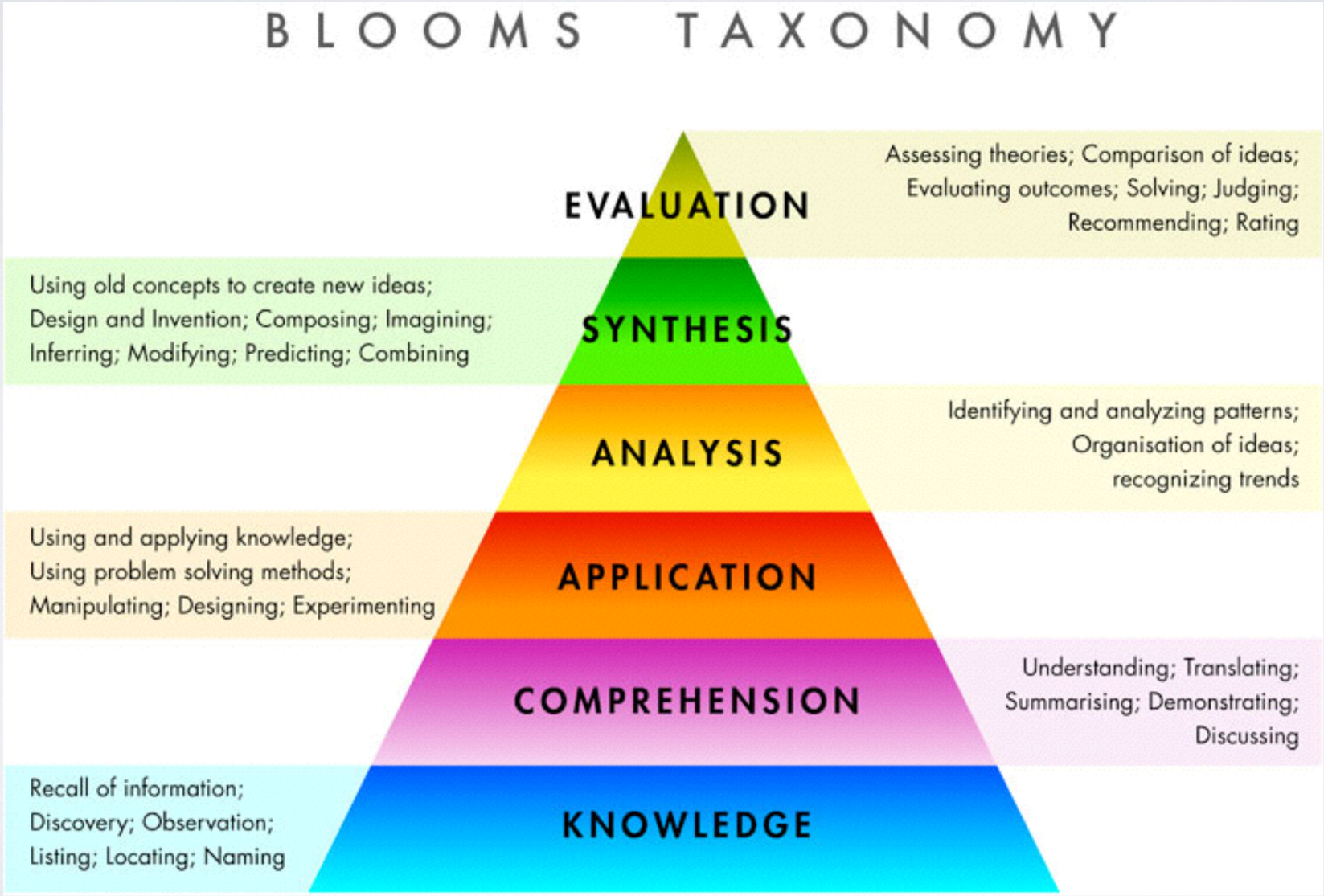
2. Design **Assessments** to address targets from Learning Goals

3. Choose & Design **Instructional Materials** aligned to Learning Goals

WHAT UbD IS REALLY ABOUT

- **PRIORITIES:** What are the most important ***big ideas*** *(from Vision & Change)* that you want students to **understand**?
- **ASSESSMENT:** What would it look like for your students to demonstrate these understandings?
- **ACTIVITIES:** How do you make these priorities clear to **yourself** and **your students** as you plan and structure your course learning activities?

UNDERSTANDING vs. KNOWLEDGE



retrieved on October 20, 2015 from Julia Cornwell (juliaec.wordpress.com)

UNDERSTANDING vs. KNOWLEDGE

"I want students to understand the Civil War." [***topic***]

"I want students to understand the causes of the Civil War."
[***topic with narrowed content focus***]

"I want students to understand that there were several interrelated causes of the Civil War—the morality of slavery, fundamentally different views about the role of the federal government, dissimilarities of regional economies, and a clash of cultures."
[***understanding*** based on student learning experiences]

UNDERSTANDING vs. KNOWLEDGE

I want students to understand that all our senses are fundamentally dependent on neuron function and nerve conduction—a process that involves the movement of chemicals, ions, and electrical charge."

[***understanding*** based on student learning experiences]

EVIDENCE OF UNDERSTANDING

"What would it take to convince you…"

…there's your assessment!

JULIE'S STORY—REFINING COURSE OBJECTIVES

original

Instructional Goal (knowledge / topic)

"Signal Transduction"

re-designed

Student Learning Goal (understanding)

"Students will ***demonstrate understanding of signal transduction*** by **explaining biological processes**.

J. Minbiole, *Improving Course Coherence and Assessment Rigor: Understanding by Design in a Non-majors Biology Course*. American Biology Teacher (in Press) 2015

WORK TIME!

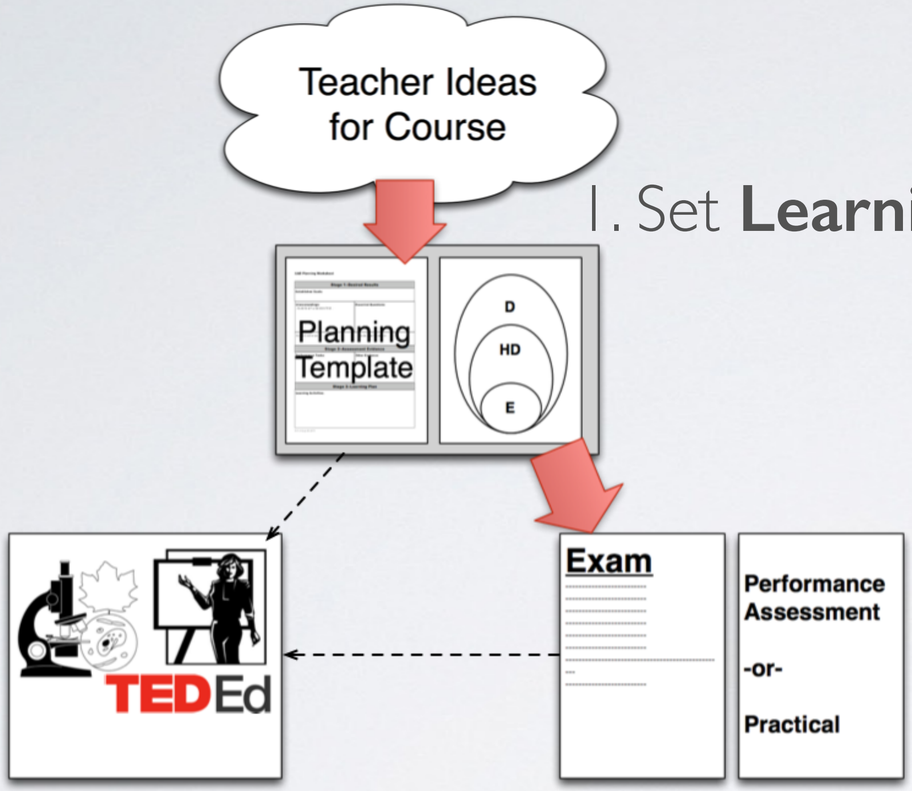
Round 1

Note: This may not be enough time to finish.
Our goal here is to get some thoughts on paper.

DISCUSSION

- Similarities / Differences in priorities?
- What was challenging about this activity?
- Did this method help, or clarify your thinking about how you would get from point A to point B?

K-U-D AND THE UbD PLANNING TEMPLATE



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3. Choose & Design **Instructional Materials** aligned to Learning Goals

UbD Planning Worksheet

Stage 1--Desired Results	
Established Goals:	
Understandings: *Students will understand that....*	**Essential Questions:**
Students will know...	*Students will be able to....*
Stage 2--Assessment Evidence	
Performance Tasks:	**Other Evidence:**
Stage 3--Learning Plan	
Learning Activities:	

Adapated from Wiggins & McTighe, 2005

adapted from J. Minbiole, *Improving Course Coherence and Assessment Rigor: Understanding by Design in a Non-majors Biology Course.* American Biology Teacher (in Press) 2015

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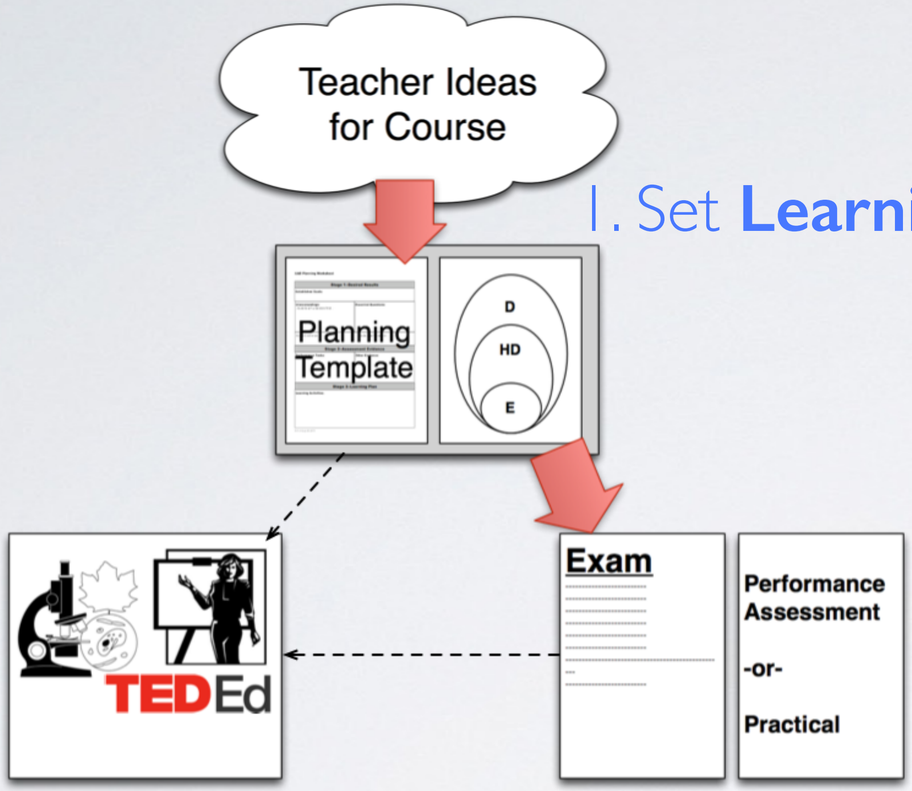

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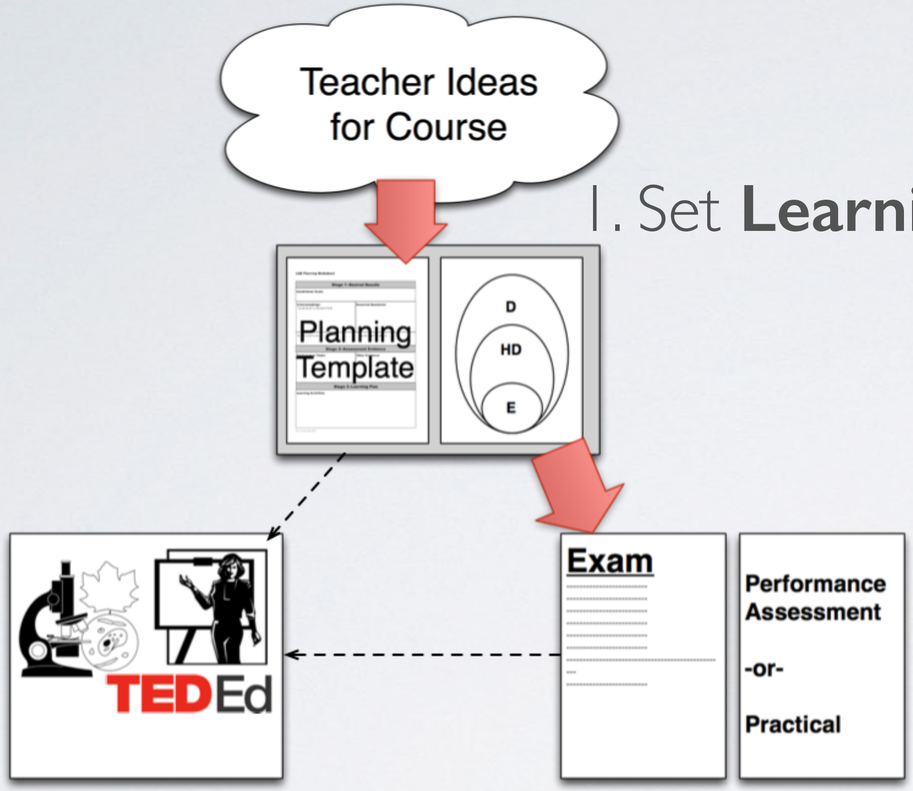

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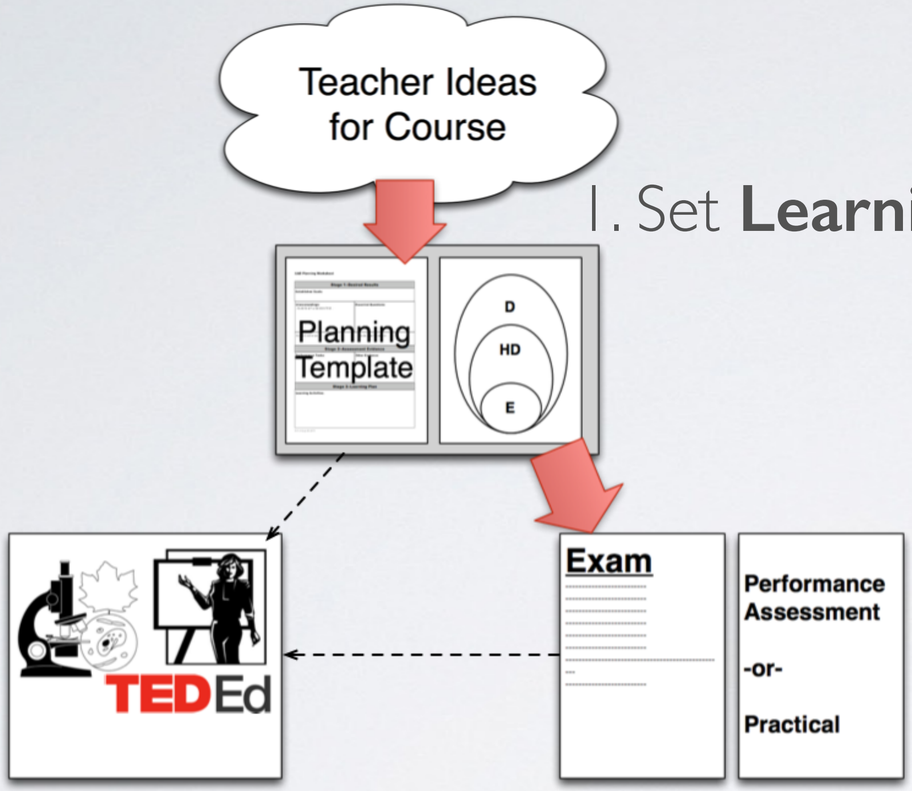

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Adapated from Wiggins & McTighe, 2005

K-U-D AND THE UbD PLANNING TEMPLATE

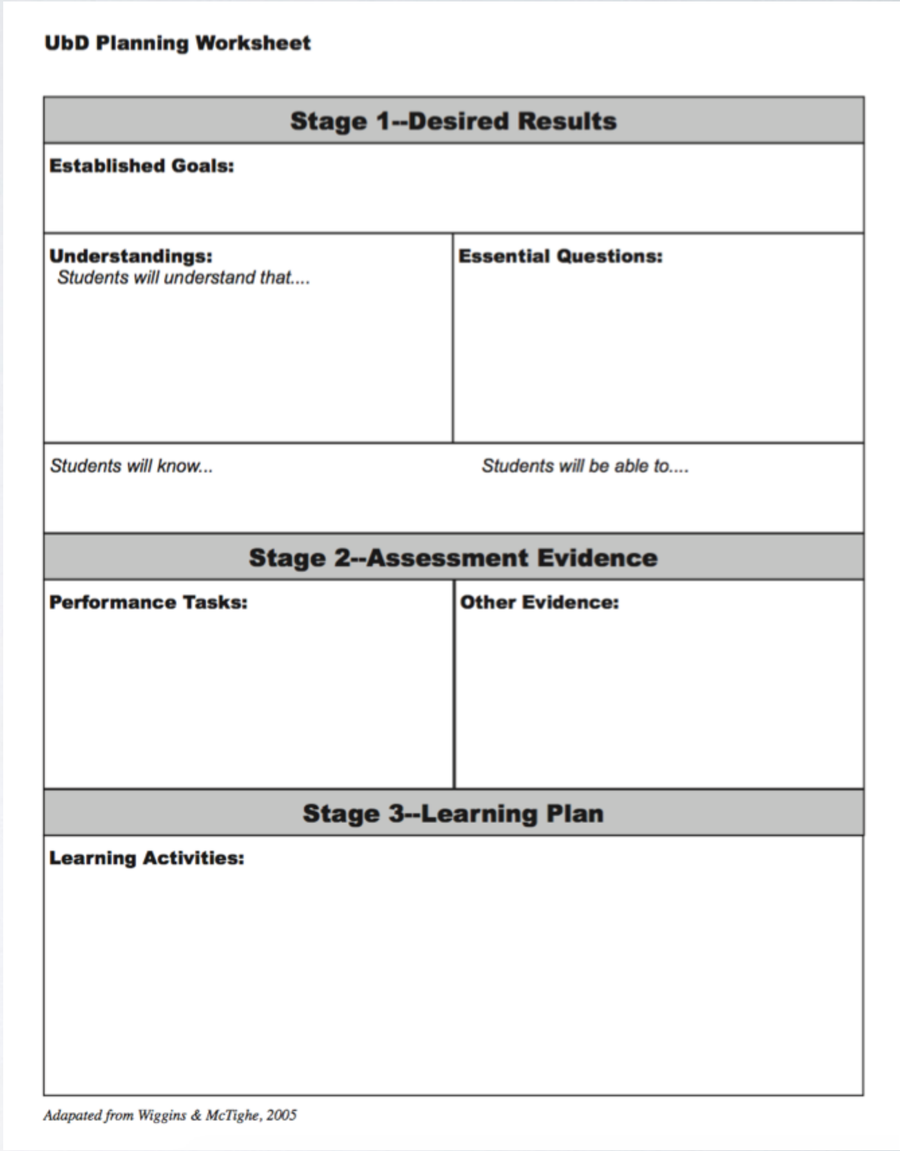
What do you want students to:

Know?

Understand?

Be able to **Do?**

(and why these distinctions matter)



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Adapated from Wiggins & McTighe, 2005

K-U-D: A USEFUL STRUCTURE

Knowledge is (of course) the facts your students will have to be able to recall and access in order to build their understanding.

Understanding

"Doings" *(student activities and performances)*

K

UbD Planning Worksheet

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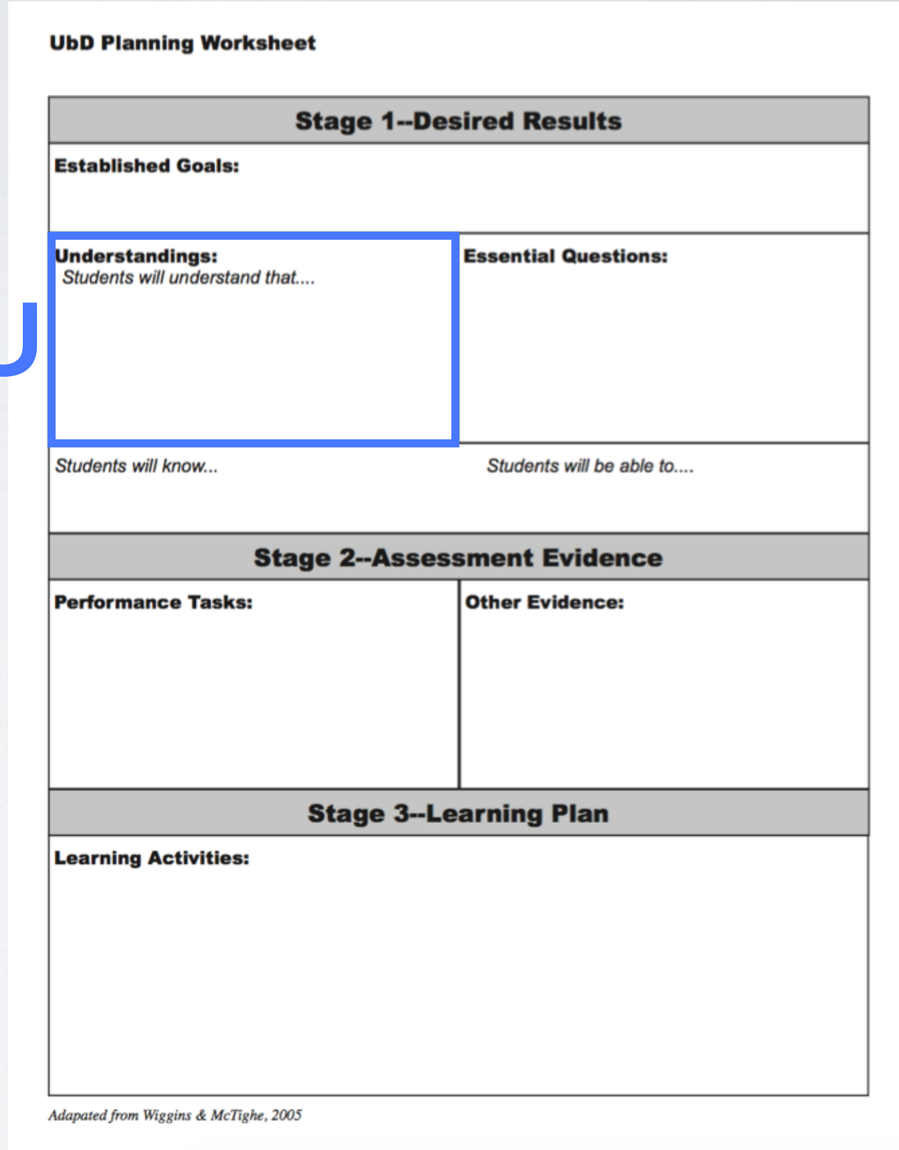
K-U-D: A USEFUL STRUCTURE

Knowledge

Understanding must ***endure*** over time; it "helps the student make sense of the content *and* will enable transfer of key ideas."

"Doings" *(student activities and performances)*

U



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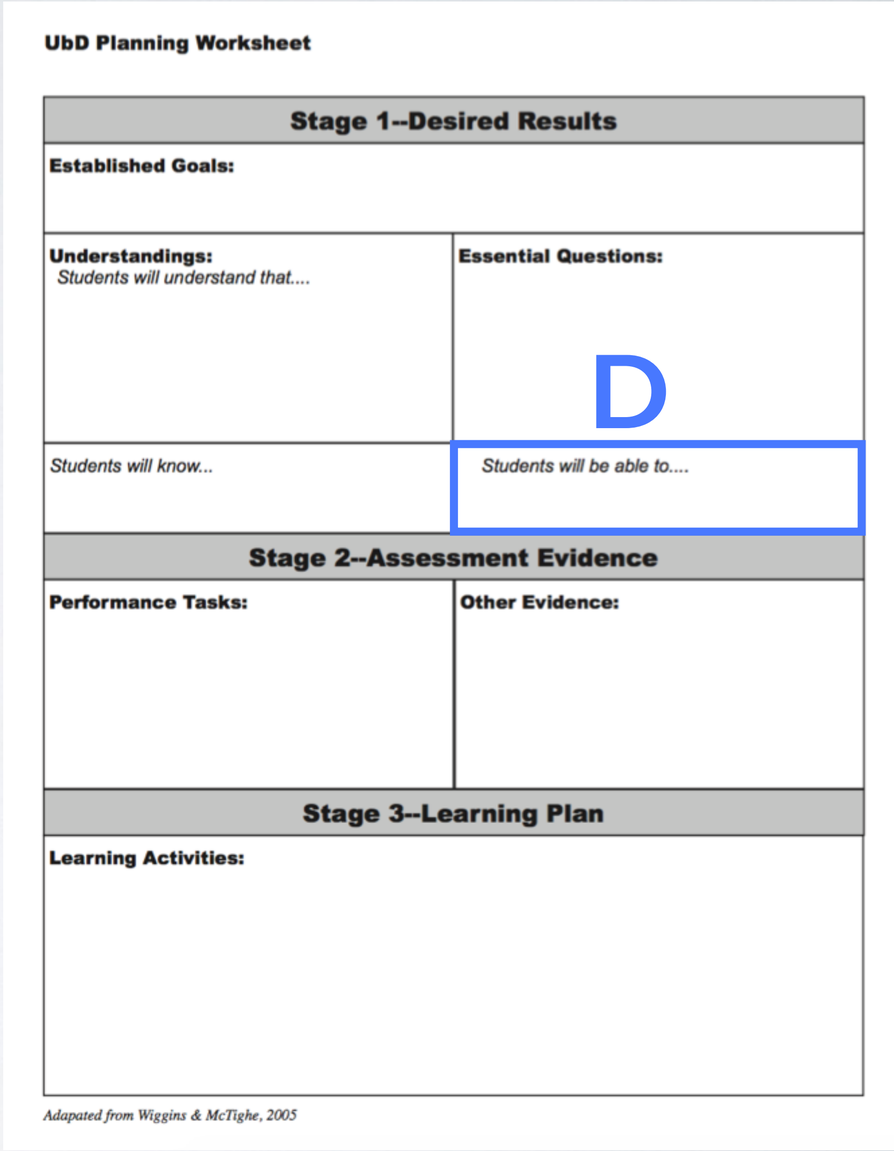
K-U-D: A USEFUL STRUCTURE

Knowledge

Understanding

"Doings" ***(student activities and performances)***

Activities that students perform to *learn* or *demonstrate understanding*



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WORK TIME!

Round 2

Note: This (again) may not be enough time to finish.
Our goal here is to give you time to think through the UbD Planning Worksheet.

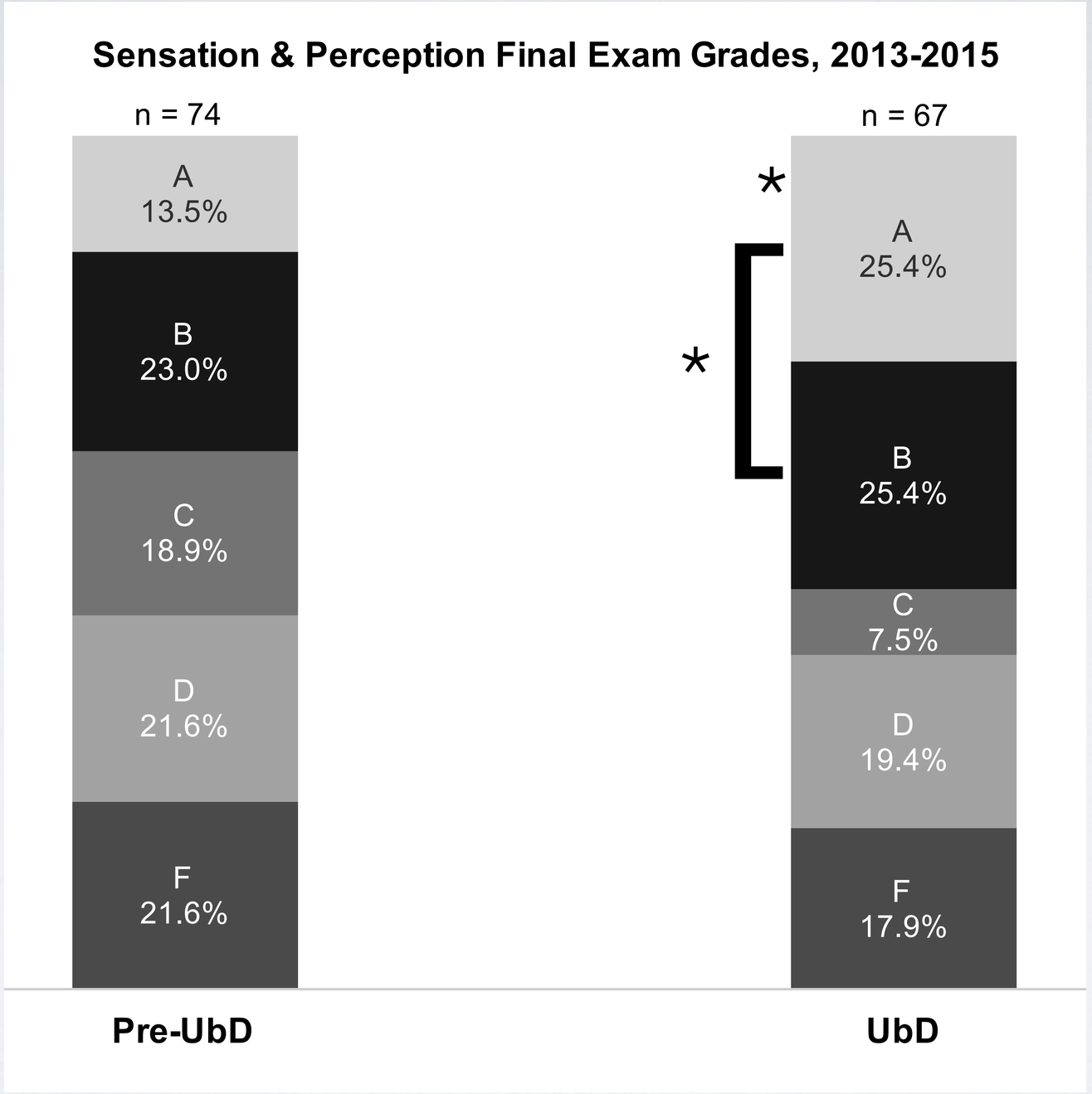
DISCUSSION

- Did the template help further organize your thinking from Round 1?
- Do you have a assessment item (Do) that you're excited about?

ASSESSMENT—BEFORE AND AFTER UbD

	Instructional Goal	**Traditional Assessment Item(s)**
original	"Signal Transduction"	**[Test Question]** / What is transduction? *(Spring 2013)*
re-designed	**Student Learning Goal** "Students will ***demonstrate understanding of signal transduction*** by **explaining biological processes**."	**UbD-revised Assessment Item(s)** **[Test Question]** / What is **transduction**? **WHERE** and **HOW** is transduction accomplished in EACH of the systems that we covered in the second half of the course? (Touch, hearing, smell, taste, and the vestibular system.) *(Spring 2015)*

adapted from J. Minbiole, *Improving Course Coherence and Assessment Rigor: Understanding by Design in a Non-majors Biology Course*. American Biology Teacher (in Press) 2015



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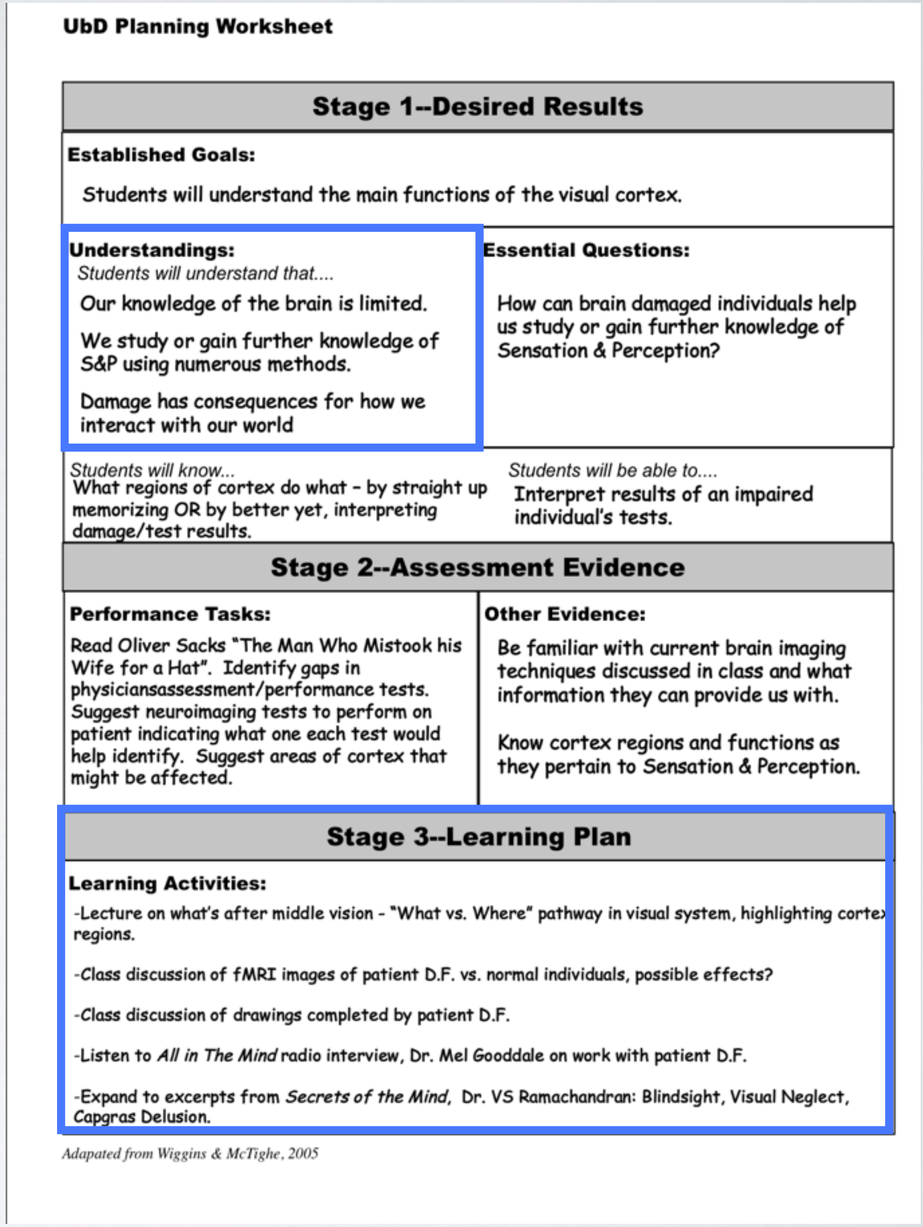
ABOUT IMPLEMENTING THE PROCESS...

- Time investment (before semester, every week)
- Not a "one and done" process

ONE LAST TOOL…

FROM WIGGINS & MCTIGHE

After identifying desired **Understandings**, we still need to prioritize our limited **learning time**…



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NESTEDNESS DIAGRAM

Julie's Genetics for non-majors

genotype→phenotype

gene expression is a process

genes turn on in response to environmental cues

RNA bridges gap btw DNA & Protein

Essential Elements

transcription factors turn on genes

protein folding affects function

Codons & tRNA

Highly Desirable Elements

RNA editing / post-transcriptional modification

RNAi affects translation (*not transcription*)

micro RNA's RNA Silencing / degradation

CRISPR

post-translational modification

Desirable Elements

NESTEDNESS DIAGRAM

Stephen's AP Biology (future majors?)

genotype→phenotype

DNA Structure

Transcription
DNA→RNA

Translation
RNA→Protein

Codons are
3-letter sequences/RNA

Essential Elements

Degeneracy of the
RNA Code / wobble

post-transcriptional
modification

splicing
introns/exons

What is a
transcription factor?

Highly Desirable Elements

Differences between
prokaryotes & eukaryotes

Ribosome &
tRNA structure

Transcription factors
can be intra / extracellular

Desirable Elements

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genes turn on in response to environmental cues

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DNA Structure

Transcription *DNA→RNA*

Translation *RNA→Protein*

Codons are 3-letter sequences/RNA

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Degeneracy of the RNA Code / wobble

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post-transcriptional modification

What is a transcription factor?

Highly Desirable Elements

Differences between prokaryotes & eukaryotes

Transcription factors can be intra / extracellular

Ribosome & tRNA structure

Desirable Elements

THANKS AND QUESTIONS

Columbia
COLLEGE CHICAGO

KSTF
Knowles Science
Teaching Foundation

UIC

Julie Minbiole
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Stephen Traphagen
stephen@mrtraphagen.com

all session materials available at **biologyprof.com/ubd**