SAOIRSE MCSHARRY, PHD
CURRICULUM FELLOW | CELL BIOLOGY

FROM Z TO A:
PRINCIPLES OF BACKWARD DESIGN

ICEBREAKER

- Name
- Position at HMS (grad student, post doc, etc)
- What you might do for a career if you weren't a scientist?

BY THE END OF THIS WORKSHOP, YOU SHOULD BE ABLE TO:

- Generate S.M.A.R.T. learning objectives.
- Use Bloom's Taxonomy to design an assessment that aligns with your course objectives.
- Evaluate the benefits of using backward design for course planning.

AGENDA

- Introductions
- Principles of backward design
- Application of backward design
  - Learning objectives 101
  - Using Bloom's Taxonomy to generate assessments

PRINCIPLES OF BACKWARD DESIGN

Writing exams in the middle of a course — Conventional habits — *Picking a favorite textbook*

Step 1

Identify desired results

- What skills do students *need* to master?
- Establish curricular priorities
- Plan learning goals

Step 2

Determine acceptable evidence

- Create assessments (write exams, prompts for projects, etc)

Step 3

Plan instruction

- Plan in-class activities
- Choose texts/ media
- Create lecture slides

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

ACTIVITY 1: MINUTE PAPER

- In your own words, describe the principles of backward design.

PRINCIPLES OF BACKWARD DESIGN

Writing exams in the middle of a course — Conventional habits — *Picking a favorite textbook*

Step 1

Identify desired results

- What skills do students *need* to master?
- Establish curricular priorities
- Plan learning goals

Step 2

Determine acceptable evidence

- Create assessments (write exams, prompts for projects, etc)

Step 3

Plan instruction

- Plan in-class activities
- Choose texts/ media
- Create lecture slides

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

AGENDA

- Introductions
- Principles of backward design
- Application of backward design
  - Learning objectives 101
  - Using Bloom's Taxonomy to generate assessments

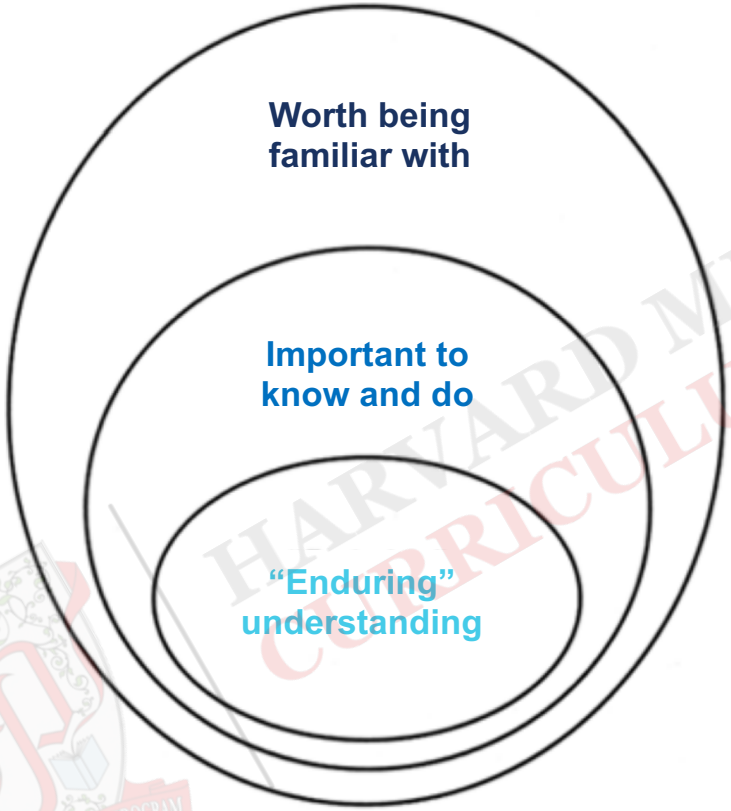
STEP 1: IDENTIFY DESIRED RESULTS

BY THE END OF THIS WORKSHOP, YOU SHOULD BE ABLE TO:

- Generate S.M.A.R.T. learning objectives
- Use Bloom's Taxonomy to design an assessment that aligns with your course objectives
- Evaluate the benefits and challenges of using backward design for course planning

How did I generate these learning objectives?

LEARNING OBJECTIVES 101: ESTABLISHING CURRICULAR PRIORITIES



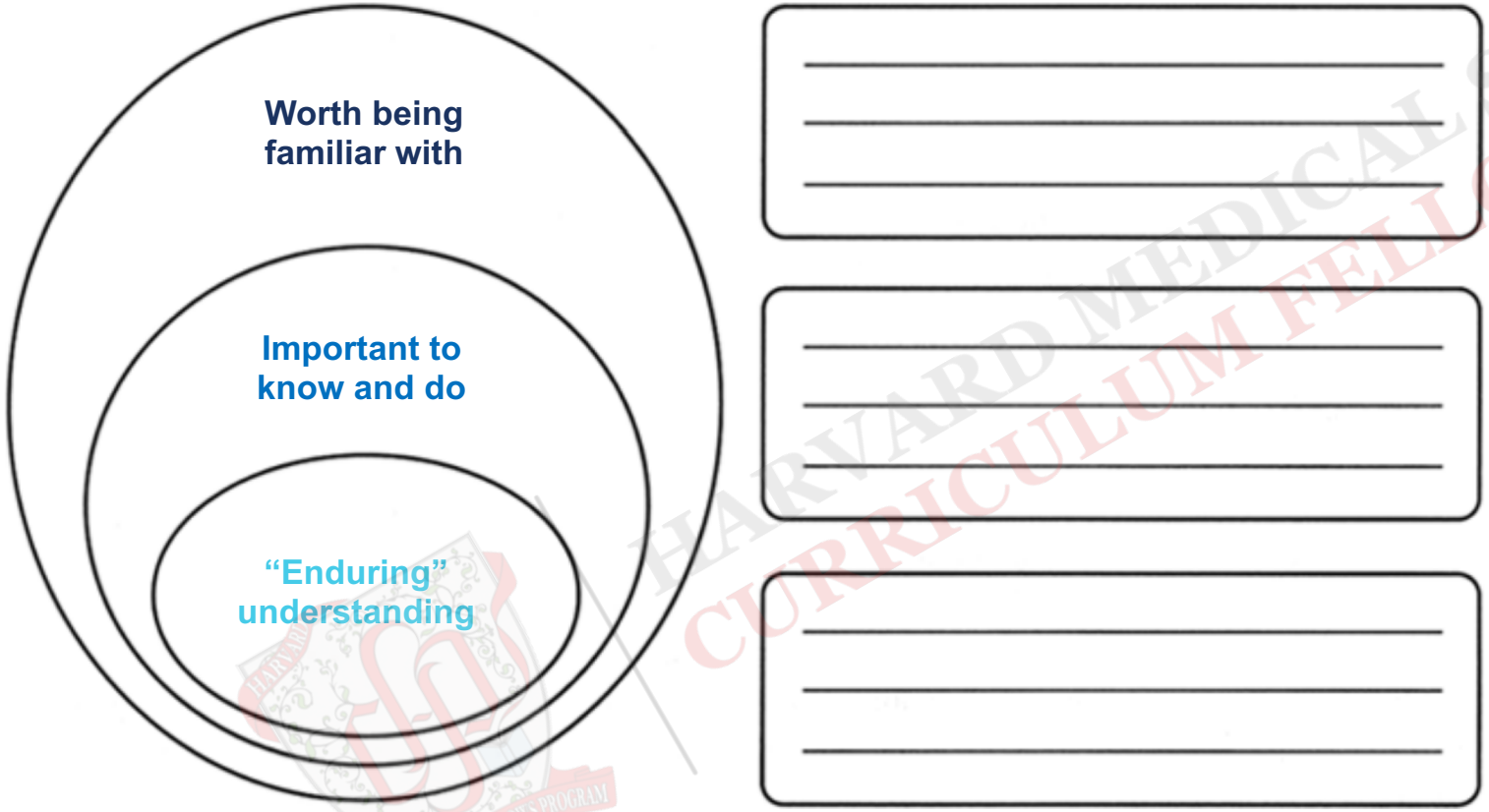
- Wiggins & McTighe 2001
- Different types of assessments
- Principles of learner-centered teaching

- Characteristics of effective (SMART) learning objectives
- Bloom's taxonomy of critical thinking skills

- Course content alignment with the skills students need
- Application of backward design to a course

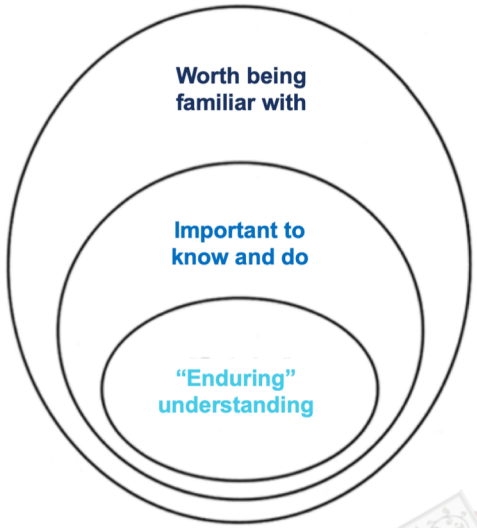
Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

ACTIVITY 2: BRAINSTORM CURRICULAR PRIORITIES FOR YOUR TEACHING CONTEXT



Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

LEARNING OBJECTIVES 102: GENERATING LO'S FROM CURRICULAR PRIORITIES



- Wiggins & McTighe 2001
- Different types of assessments
- Principles of learner-centered teaching

- Characteristics of effective (SMART) learning objectives
- Bloom's taxonomy of critical thinking skills

- Course content alignment with the skills students need
- Application of backward design to a course

?

BY THE END OF THIS WORKSHOP, YOU SHOULD BE ABLE TO:

- Generate S.M.A.R.T. learning objectives
- Use Bloom's Taxonomy to design an assessment that aligns with your course objectives
- Evaluate the benefits and challenges of using backward design for course planning

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

LEARNING OBJECTIVES 101:
EFFECTIVE LEARNING OBJECTIVES ARE S.M.A.R.T.

Uses explicit language that clearly communicates the exact knowledge or skill that's expected to be learned

Includes an action that can be observed and objectively judged

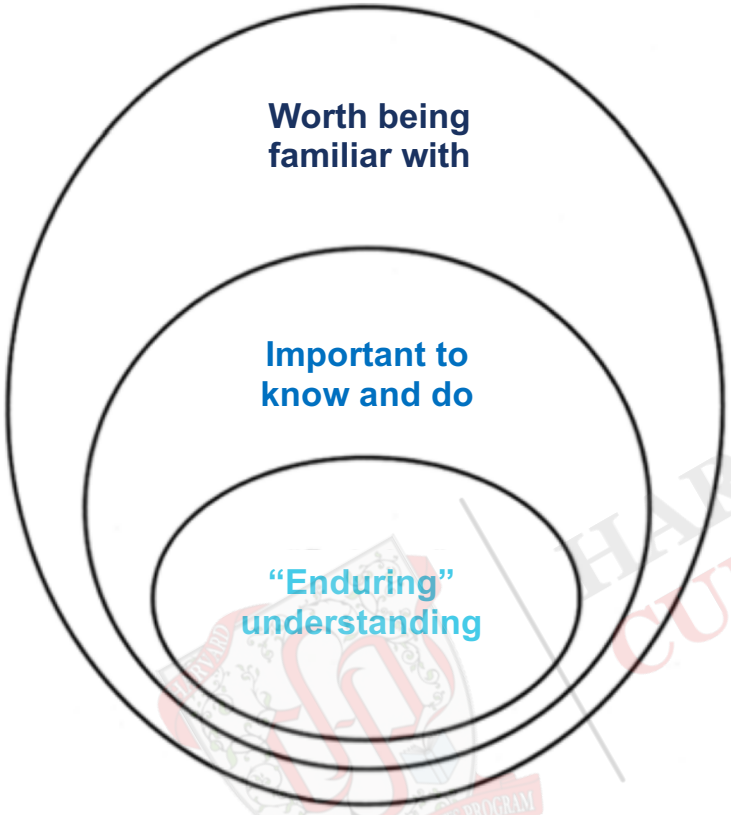
Contains a goal that learners are capable of achieving (given prior knowledge or scaffolding)

Includes something the learner will find valuable (interesting, important, useful, etc)

Considers the feasibility of the task in an explicitly defined amount of time

Toolshero.com

IS MY DRAFT LEARNING OBJECTIVE EFFECTIVE? WHY OR WHY NOT?



- Wiggins & McTighe 2001
- Different types of assessments
- Principles of learner-centered teaching

- Characteristics of effective (SMART) learning objectives
- Bloom's taxonomy of critical thinking skills

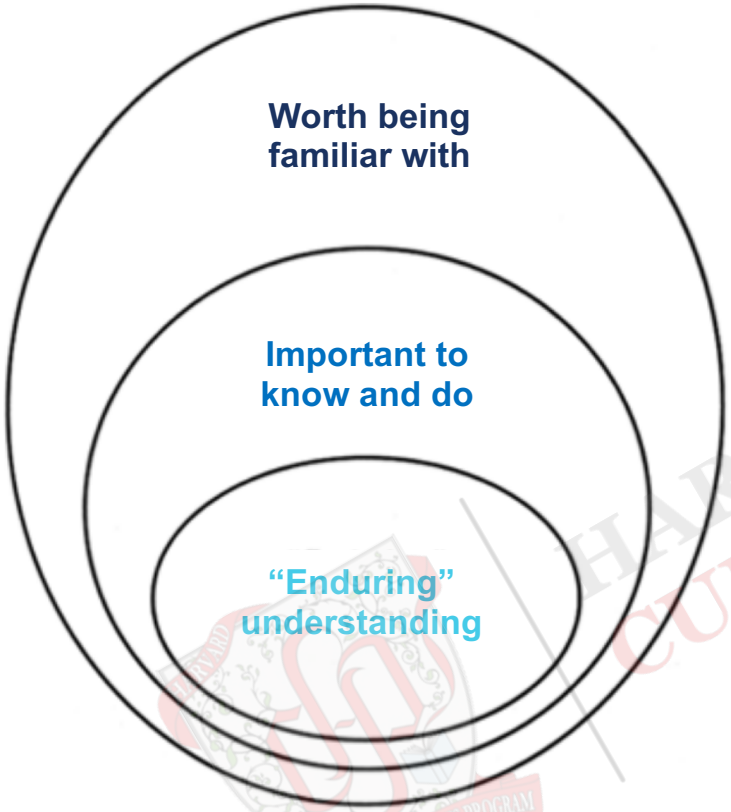
- Course content alignment with the skills students need
- Application of backward design to a course

By the end of this course, students should be able to:

1. Understand the characteristics of effective learning objectives.

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

IS MY DRAFT LEARNING OBJECTIVE EFFECTIVE? WHY OR WHY NOT?



- Wiggins & McTighe 2001
- Different types of assessments
- Principles of learner-centered teaching

- Characteristics of effective (SMART) learning objectives
- Bloom's taxonomy of critical thinking skills

- Course content alignment with the skills students need
- Application of backward design to a course

By the end of this course, students should be able to:

~~1. Understand the characteristics of effective learning objectives.~~

By the end of this course, students should be able to:

1. Generate effective (SMART) learning objectives.

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

ACTIVITY 3: DRAFT 1-3 LEARNING OBJECTIVES BASED ON YOUR CURRICULAR PRIORITIES

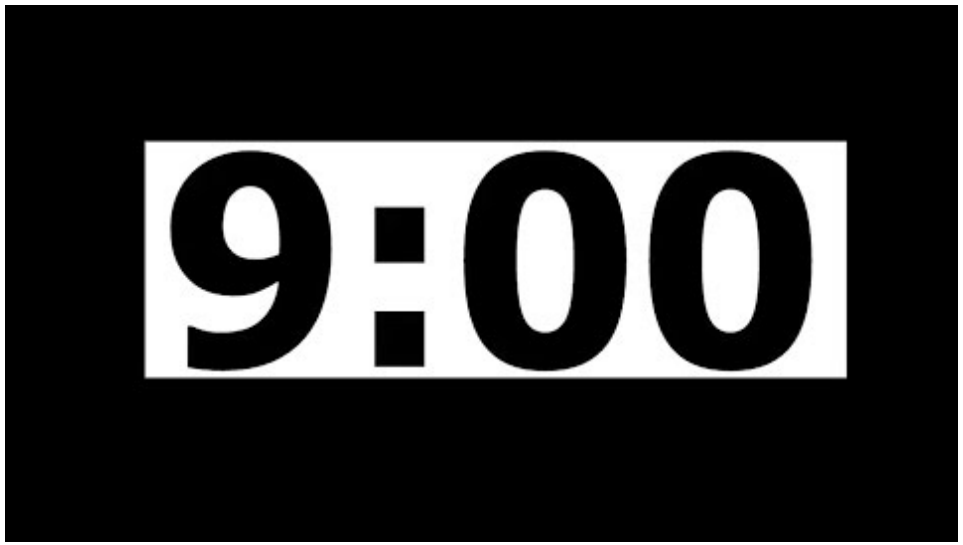
Toolshero.com

ACTIVITY 3: DRAFT 1-3 LEARNING OBJECTIVES BASED ON YOUR CURRICULAR PRIORITIES

Exchange your draft learning objectives with a neighbor.

Can you suggest any revisions that would make them SMARTer?
Revise your own learning objectives accordingly.

Toolshero.com



AGENDA

- Introductions
- Principles of backward design
- Application of backward design
  - Learning objectives 101
  - Using Bloom's Taxonomy to generate assessments

PRINCIPLES OF BACKWARD DESIGN

Step 1

Identify desired results

- What skills do students *need* to master?
- Establish curricular priorities
- Plan learning objectives

Step 2

Determine acceptable evidence

- Create assessments (write exams, prompts for projects, etc)

Step 3

Plan instruction

- Plan in-class activities
- Choose texts/ media
- Create lecture slides

Wiggins, Grant & Jay McTighe, "What is backward design?" in *Understanding By Design*. 2001

STEP 2: DETERMINE ACCEPTABLE EVIDENCE

- **Generate S.M.A.R.T. learning objectives**

→ Administer a test where participants generate learning objectives

- **Use Bloom's Taxonomy to design an assessment that aligns with course objectives**

→ Participants work in pairs to generate an assessment that aligns with a given course objective

- **Evaluate the benefits and challenges of using backward design for course planning**

→ Participants write a minute-paper describing the pros and cons of backward design

STEP 2: DETERMINE ACCEPTABLE EVIDENCE

- **Generate S.M.A.R.T. learning objectives**

→ Administer a **test** where participants generate learning objectives

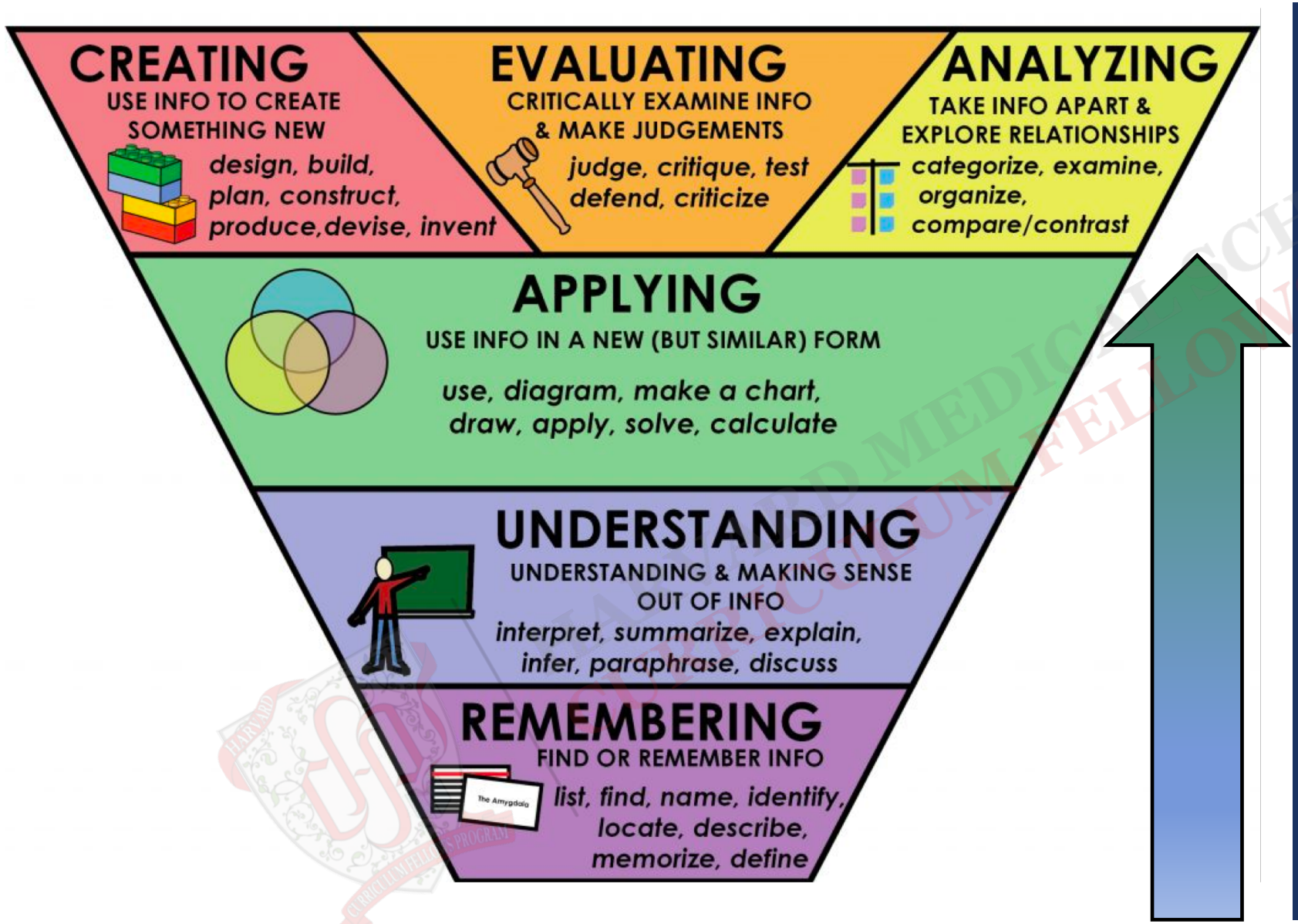
- **Use Bloom's Taxonomy to design an assessment that aligns with course objectives**

→ Participants **work in pairs** to generate an assessment that aligns with a given course objective

- **Evaluate the benefits and challenges of using backward design for course planning**

→ Participants write a **minute-paper** describing the pros and cons of backward design

Notice: A range of *assessments* can be used to assess a range of ***understanding***



BLOOM'S TAXONOMY OF CRITICAL THINKING SKILLS

Toppr.com/bytes/blooms-taxonomy/

ACTIVITY 4: DESIGN AN ASSESSMENT FOR ONE OF YOUR LEARNING OBJECTIVES

9:00

STEP 3: PLAN INSTRUCTION

Workshop plan:

12:00-12:10 Introductions and icebreaker

12:10-12:15 Agenda + overview of backward design
Backward design process (Wiggins & McTighe, 1988)

1. Identify desired results
    a. What skills do students need to master?
    b. Establish curricular priorities
    c. Plan learning goals
2. Determine acceptable evidence
    a. Create assessments (write exams, project prompts, etc)
3. Plan instruction
    a. Plan in-class activities
    b. Choose texts/ media
    c. Create lecture slides

12:15-12:20 Activity 1: *Minute paper*
In your own words, describe the principles of backward design. Review your essay with a partner.

- Plant the seeds of pros and cons

12:20-12:25 Learning objectives 101
What do we want students to be able to achieve, in the *broader context* of discipline?
Let's establish *curricular priorities* by defining content/ skills that are:
- Worth being familiar with
- Important to know and do
    - What component knowledge or skills will get students to that mastery?
- Enduring understanding
    - What are skills that biologists need to master?

12:25-12:35 Activity 2: *Brainstorm curricular priorities for your teaching context*

12:35-12:40 Learning objectives 102
Now that we have an idea of which content to prioritize, let's create corresponding learning objectives. The most effective LO's are SMART: **S**pecific, **M**easurable, **A**ttainable, **R**elevant, & **T**ime-aware.

12:40-12:55 Activity 3: Generate 1-3 learning objectives/ peer review
Generate 1-3 draft learning objective(s) based on your curricular priorities brainstorm, and then review them with a partner. How could each objective be revised to be more effective?

12:55-1:00 Assessment design with Bloom's Taxonomy

- Types of assessment methods can range in complexity the same way that student mastery can range in complexity— from informal check for understanding to quizzes/tests (may span recall through synthesis) to projects or presentations (synthesis)
- Keep in mind any necessary scaffolding
- Description of Bloom's taxonomy of critical thinking skills
- Handout of Bloom's with verbs
    - Helpful for generating assessments & writing LO's
- Handout of 50 CATs

1:00-1:10 Activity 4: Design an assessment to collect evidence for students' meeting one of your learning objectives
Pick one of your learning objectives and use Bloom's Taxonomy to design a related assessment.

1:10-1:20 Large group discussion:
Name some pros & cons of backward design from the perspectives of students and instructors
See chart below.

1:20-1:25 Recap/ questions

1:22-1:30 Workshop feedback

STUDENT'S PERSPECTIVE		INSTRUCTOR'S PERSPECTIVE	
Pros	Cons	Pros	Cons

ACTIVITY 5
LARGE GROUP DISCUSSION

WHAT ARE THE PROS & CONS OF BACKWARD DESIGN?

STUDENT'S PERSPECTIVE

Pros	Cons
- Important skills and content are directly addressed in class and on assessments - Published learning objectives explicitly identify material we're expected to master - Reflection on overall course goals can help us see the course as a whole and build mental models of how concepts relate to each other	- Unpublished learning objectives could make the course harder - Individual's needs/ purpose for learning might be different than instructor's goal(s)

INSTRUCTOR'S PERSPECTIVE

Pros	Cons
- Writing exams is easier with pre-written learning objectives - Thinking about what constitutes mastery early on makes us consider grading early on - Well-designed assessments can help us evaluate our teaching methods - Helps us design courses and lessons that are coherent, on-topic, and organized	- Takes more time upfront to plan - Publishing learning objectives can make the course too easy for students if they don't have to determine the key concepts on their own

WHAT ARE THE PROS & CONS OF BACKWARD DESIGN?

FROM Z TO A: PRINCIPLES OF BACKWARD DESIGN

1. Identify desired results

2. Determine acceptable evidence

3. Plan instruction

BY THE END OF THIS WORKSHOP, YOU SHOULD BE ABLE TO:

- Generate S.M.A.R.T. learning objectives
- Use Bloom's Taxonomy to design an assessment that aligns with your course objectives
- Evaluate the benefits and challenges of using backward design for course planning

Further reading: