UbD Stage 1

Understanding by Design

Based on the work of
Grant Wiggins & Jay McTighe
Adapted by Wallingford Public Schools

What is Understanding by Design?

- Not so much about learning a few new technical skills as it is learning to be more thoughtful and specific about our purposes.
- Requires thinking first about the specific learnings sought, and what evidence of such learning will look like, before thinking about what we will offer in the way of teaching and activity.

Three stages of backward design

1. Identify desired results

2. Determine acceptable evidence

Then, and only then

3. Plan learning experiences & instruction

“Backward” design logic

1. What do you value? (Stage 1)
2. How do you evaluate what you value? (Stage 2)
3. How do you prepare students for the evaluations so that they can demonstrate understanding? (Stage 3)

Issues in Science Education

- Curricula that is a mile wide and an inch deep
- Focus solely on so called facts instead of “doing hands-on minds on science”
- So much to teach so little time….
- Achievement gap

So much to teach so little time…

- Must strike a balance between expectations that are reasonable and expectations that are paralyzing.
- Need to find a balance between ‘teacher telling’ and ‘student discovering.’
- Must strike balance between breadth and depth of curriculum.

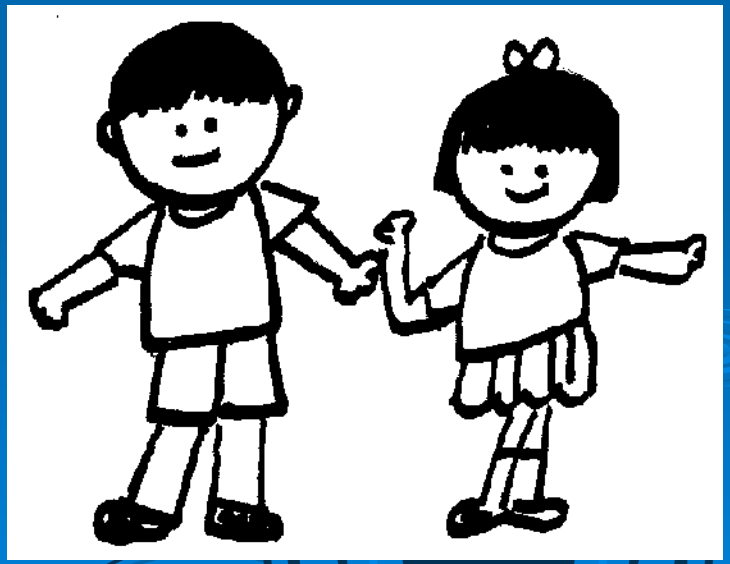
A Key Rationale for UbD

Overcoming the prevalence of

"Aimless Activity"

and

"Superficial Coverage"



Example: “Life on the Prairie” –a typical 3rd grade unit

Overview of activities (page 6)

- Read handout on “life on the prairie”. Answer the questions.
- Read “Sarah Plain and Tall” and complete a word search on pioneer vocabulary.
- Create a “pioneer life” memory box containing pioneer “artifacts” and a journal.

Prairie Day Con't…

Complete 7 learning stations during "prairie day"

- Churn butter
- Play 19th century game
- Send letter home w/ sealing wax
- Play "dress the pioneer" computer game
- Make a corn husk doll
- Quilting
- Tin punching

Prairie Day…

Letter sent home with student comments from all the 3rd grade classes:

- **Teacher prompt:** "What did you learn and what did you like about Prairie Day?"

Revealing Student Comments

- I liked the tin punching because you could make your own design or follow other designs. You can see the sunlight through the holes.
- I like the station where you wrote a letter. I liked it because you put wax to seal it.

Revealing Student Comments

- It was fun to design an outfit for myself on the computer.
- I liked the prairie games. My favorite was the sack race because I like to jump.
- I liked the corn husk doll because it was fun. **I learned** that making dolls was not easy.

Page 7 & 8 UbD handouts

3 Stages with an understanding focus

1. What should students come away understanding?

2. What is evidence of that understanding?

Then, and only then

3. What activities will develop the understandings?

STAGE 1

Identify desired results

Stage 1 – Desired results

Stage 1 – Desired Results

Content Standard (s): G

Provide a framework for curriculum design; generalizations that define parameters about what students are expected to know and be able to do

Understanding (s): EU

Students will understand that…

Insight into the generalization; what students will walk away with

Essential Question (s): EQ

Inquiry used to explore the generalization to enable students to earn the understanding

Knowledge: K

Student will know …

Skills: S

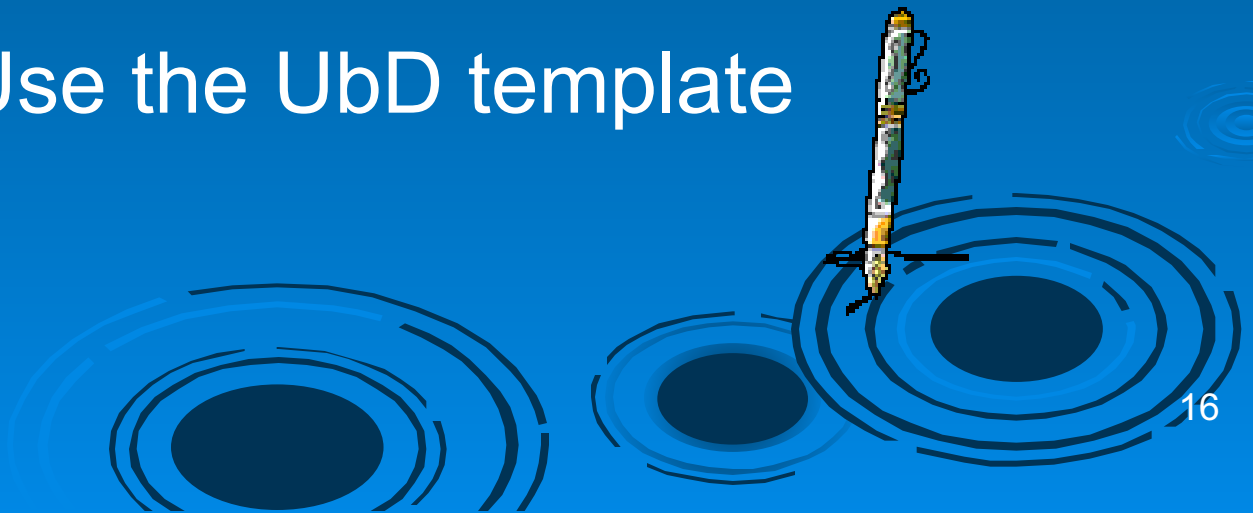
Students will be able to …

Specific priorities about what students are expected to know and be able to do

Your Task

- Select a unit topic that you will teach / have taught
- Identify Related Content Standards

Use the UbD template

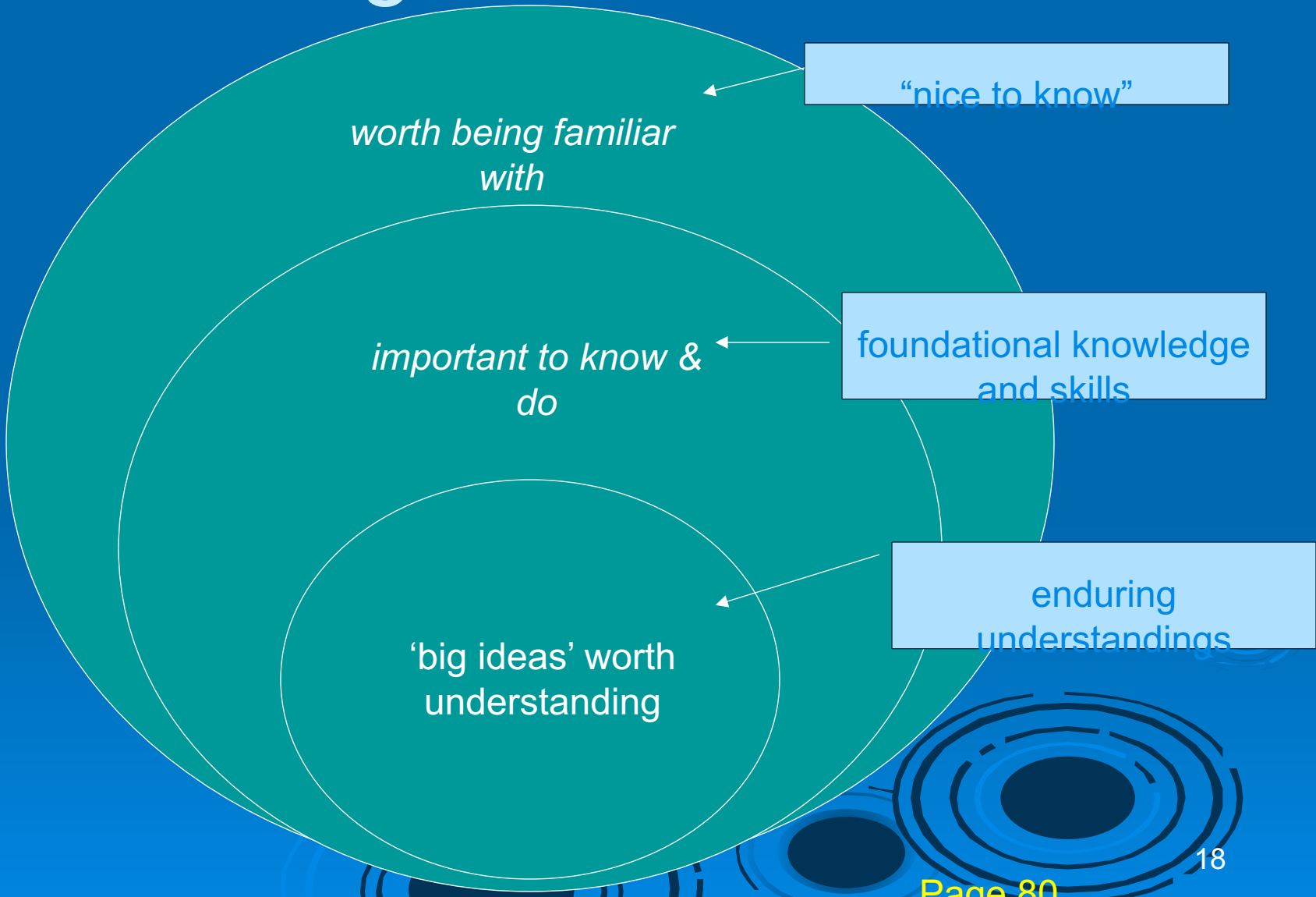


What does the research say?

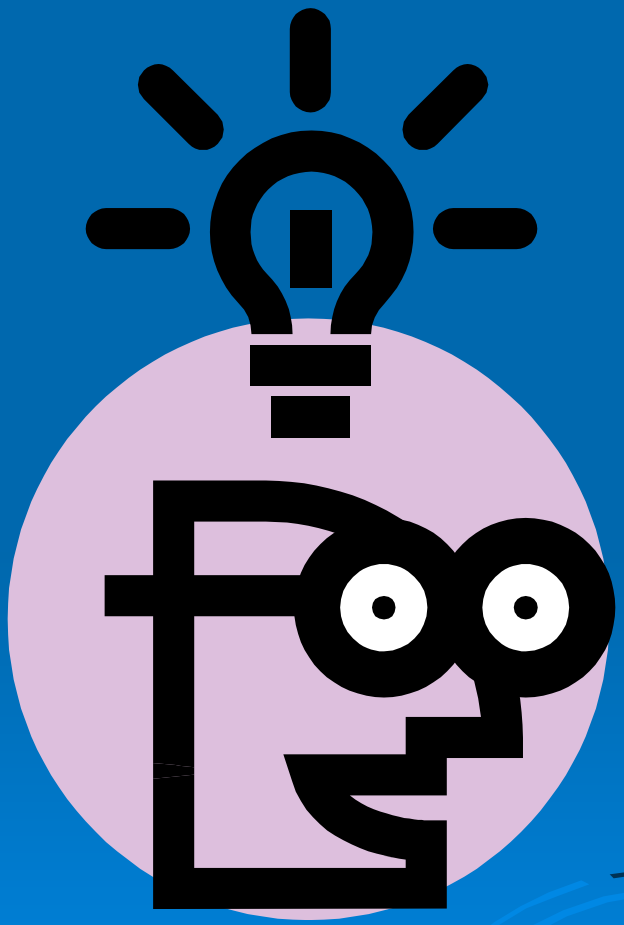
"We turn now to the questions of how experts' knowledge is organized…Their knowledge is not simply a list of facts and formulas that are relevant to the domain; instead, their knowledge is organized around core concepts or 'big ideas' that guide their thinking about the domain."

-- Bransford, *How People Learn*

Establishing Curricular Priorities



Design Standard for ENDURING UNDERSTANDINGS



- Enduring, based on transferable, big ideas at the heart of the discipline
- Need to be “uncovered”, not merely stated
- Transcends individual lessons
- Starts with the stem: “The student will understand that….

Sample EUs

- The Earth is dynamic and changing.
- Society has a responsibility to conserve and protect our natural resources and to develop alternative energy sources.
- Scientists make the results of their investigation public; they describe the investigations in ways that enable others to repeat the investigation.

Design Standard for ESSENTIAL QUESITONS

"Big ideas" framed by questions that:

- Spark meaningful connections
- Provoke genuine inquiry and deep thought
- Encourage transfer
- Often many "correct" answers or ways to answer

Science Essential Questions

- If all living organisms are built of cells, why do we all look different?
- How do living things interact with their environment in order to survive?
- How do environmental changes affect the organisms in that environment?
- How are geologic features of the earth driven by internal energy to produce surface changes?

Asking appropriate questions

Staying faithful to you, the discipline, and your students:

- ✓ Does your essential question meet your specific curricular needs?
- ✓ Are these needs at the heart of the discipline?
- ✓ Will students be engaged with the questions so that they can use them to earn the understandings?

Big ideas - mean and median

Enduring understandings	Essential Questions
•The mean “evens out” or “balances” a set of data and that the median identified the “middle” of a data set. •The mean is more likely to be influenced by extreme values, since it is affected by the actual data values, but the median involves only the relative positions of the values.	How do changes in data values affect mean and median of a set of data?

Adapted from NCTM website

Continuum of Understanding

- Must dig below the surface to uncover un-obvious insights
- Takes time, practice, and hard work
- Not a matter of “either you get or you don’t” (as it is with facts) but a matter of degree

Big ideas – life cycle

Enduring understandings	Essential Questions
•Flowering plants have a life cycle that involves changes in growth and structure that ensures production of new plants.	•How does the plant change over the course of its life? •How do flowering plants produce seeds and new plants?

BIG IDEA – Structure and Function

CT Science Content Standard

3.2 Organisms can survive and reproduce only in environments that met their basic needs.

- Plants and animals have features that help them live in different environments.

Enduring Understanding

Organisms possess specific structures that increase their chances of functioning successfully in their environment.

Big ideas about representation

15/100

3/20

0.15

15%

Are all representations of the same number

- **Essential question:**

What's the best way to represent this number?

- **Enduring Understanding**:

Representations may not be equally suitable to use in a particular context.

Adapted from NCTM website

Tips for writing understandings

- Avoid stating the desired understanding as a topic or a phrase.
  - ✓ e.g. “the Westward movement”
- Instead, frame as “students understand that …”
  - ✓ e.g. “Settlers endured great hardship in their quest for land in the West.”

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Two Types of Enduring Understandings

1. Overarching Understanding

Science is the method of observation and investigation used to understand our world.

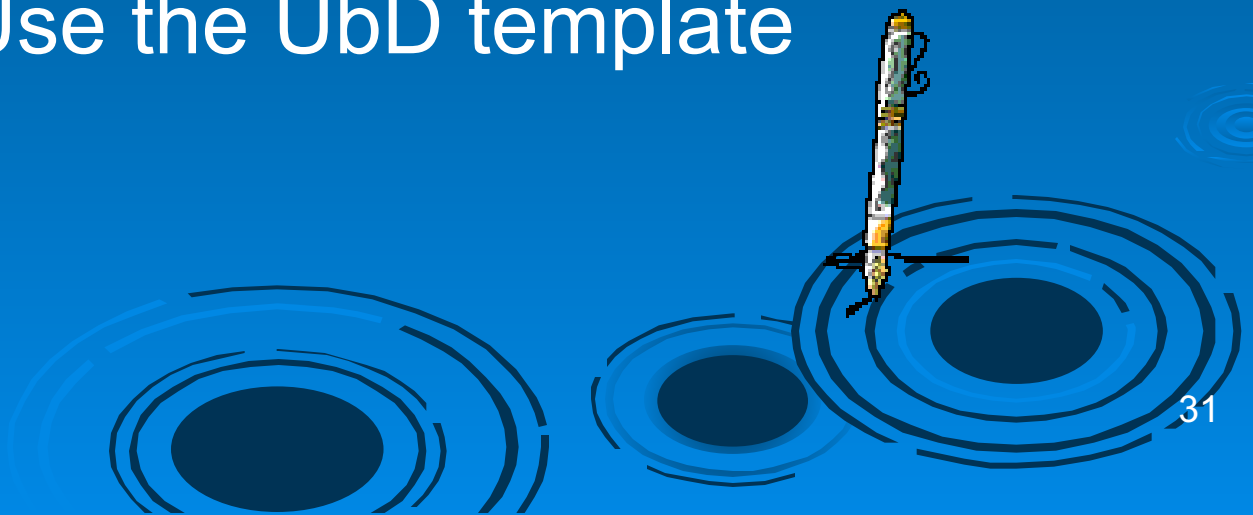
2. Topic Understandings

- Scientists use various tools to measure and describe weather in order to help predict future weather patterns. (gr 3)

Your Task

- Draft the Enduring Understandings and Essential Questions for your unit

Use the UbD template



Check your Work

Design Standard for ESSENTIAL QUESITONS

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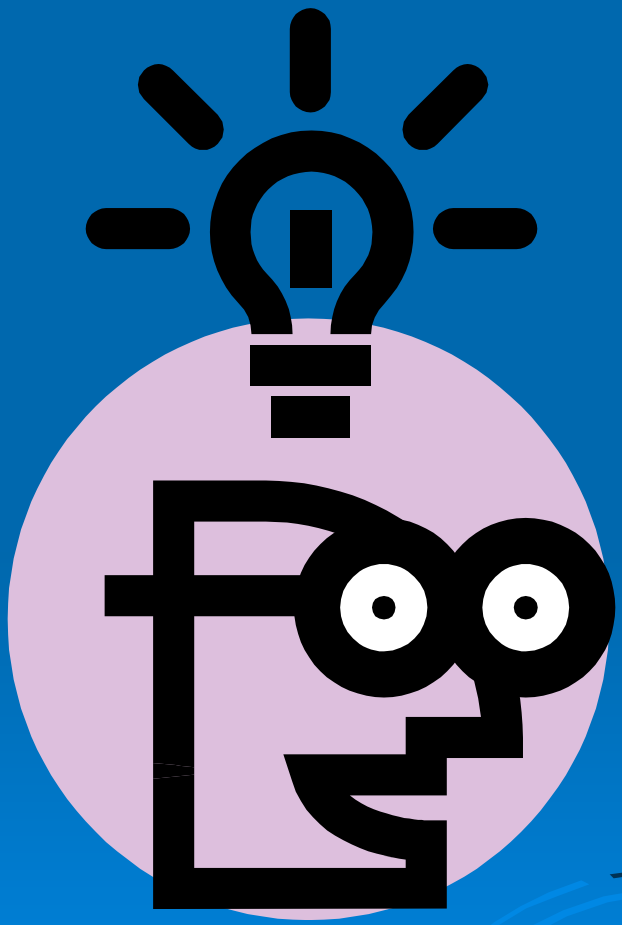
Design Standard for ENDURING UNDERSTANDINGS



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Relationship between essential questions and knowledge and skills

ESSENTIAL QUESTION:

- If all living organisms are built of cells, why do we all look different?

KNOWLEDGE:

1. describe the structure of DNA
2. explain the process of protein synthesis
3. analyze the relationships between DNA, genes, proteins, and traits.
4. examine the pathways by which protein synthesis can results in mutation
5. apply these concepts to the current issues in genetic engineering
6. evaluate issues surrounding the moral ambiguity of gene manipulation

Adapted from sample unit on UbD exchange

Design Standards for KNOWLEDGE AND SKILLS

- Includes Knowledge & Skills (inquiry, literacy and/or numeracy)
- Start with the stem: “To understand, students will need to……” or “Students will be able to…”
- Verbs reflect higher order thinking (Blooms taxonomy)
- Typically only one verb per objective

Examples of “K” Objectives

- K1. Summarize the conditions necessary for plant growth.
- K2. Identify the distinct stages in the life cycle of a flowering plant.
- K3. Conclude that flowering plants must be pollinated in order to produce new seeds.
- K4. Recognize the interdependence between the pollinator and the plant.

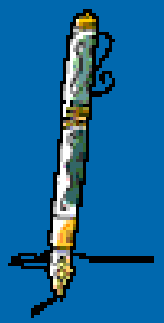
Examples of “S” Objectives

- S1. **Generate** investigable and non-investigable questions
- S2. **Observe** objects and describe commonalities and differences among them.
- S3. **Classify**, based on observation of properties
- S4. **Design** an investigation to help answer an investigable question
- S5. **Conduct** simple experiments
- S6. **Collect and record** data utilizing simple measuring tools
- S7. **Organize** results in an appropriate manner, using……
- S8. **Communicate** results or information in an appropriate manner, using ……

Repeating slide show of slides 37-41 during "work time"

YOUR TASK

- Draft Knowledge & Skills (objectives)



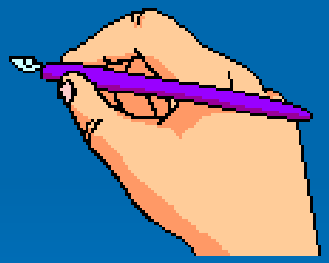
"What do I want my students to know and be able to do by the end of this unit?"

Talking Points

- What is this topic really about?
- Why does it matter to study?
- What makes it connect to the lives of learners?
- What are the key concepts that give the topic meaning?
- How does the topic help students understand the discipline better?
- What is the potential of this topic to help students understand themselves and their world?

Reflect

- Is there alignment between all the boxes?
  - Content Standards
  - EU & EQ
  - Knowledge & Skills



Revise as needed

Design Standards for KNOWLEDGE AND SKILLS

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Three stages of backward design

1. Identify desired results

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Moving on to….

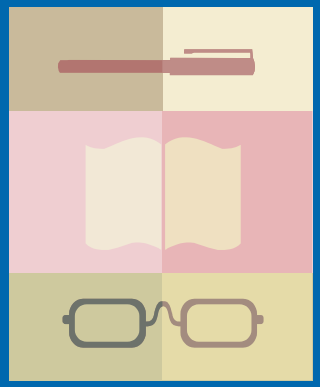
Stage 2

Determine acceptable evidence

Stage 2 – Assessment evidence

Stage 2 – Assessment Evidence	
Performance Task (s) T	Other Evidence OE

Range of assessment opportunities



- Varied types, over time:
  - ✓authentic tasks and projects
  - ✓academic exam questions, prompts, and problems
  - ✓quizzes and test items
  - ✓informal checks for understanding
  - ✓student self-assessments

Establishing Curricular Priorities

Assessment Types

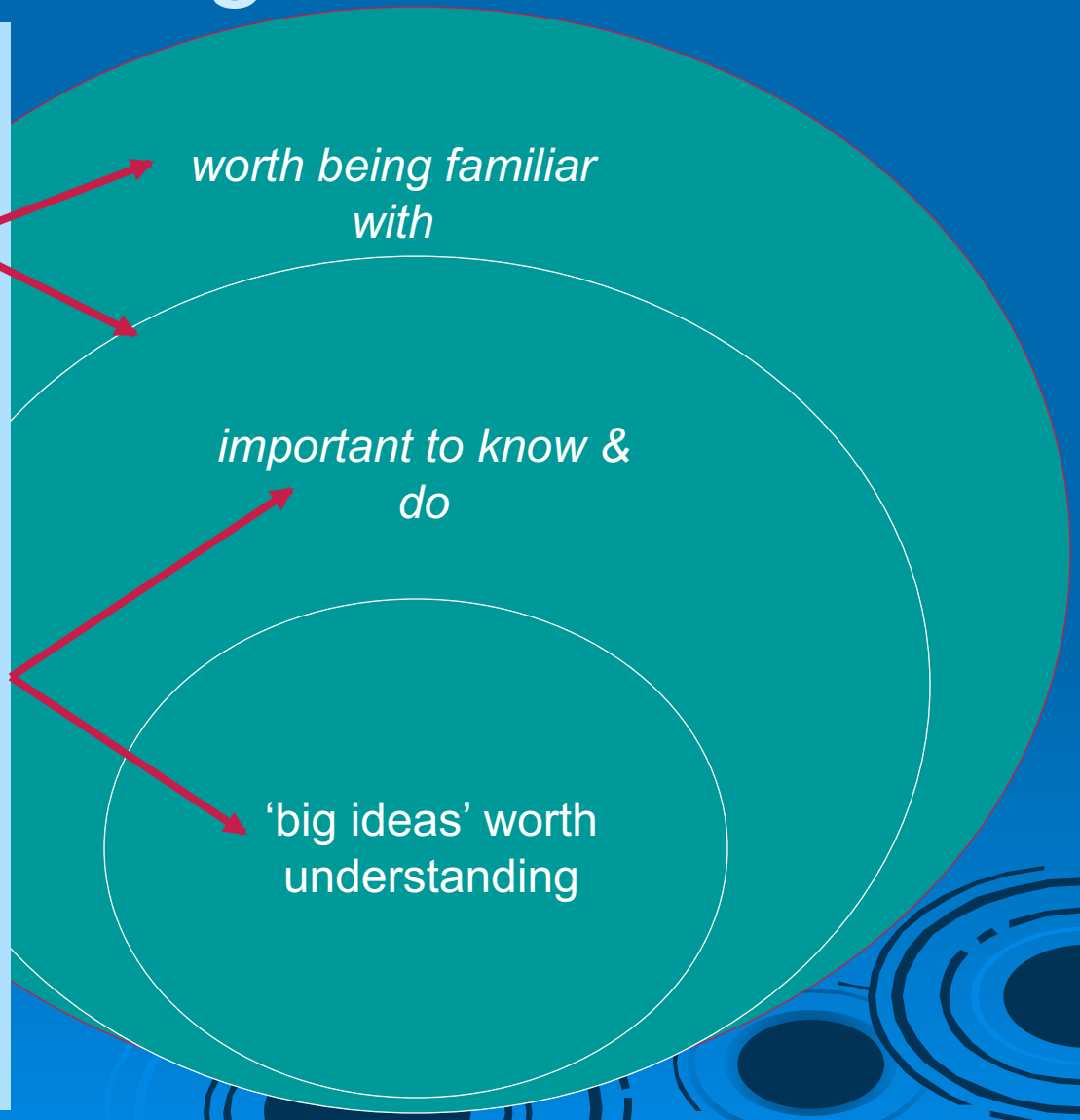
Traditional

Quizzes & tests

- Paper/pencil
- Selected response
- Constructed-response

Performance Tasks and Projects

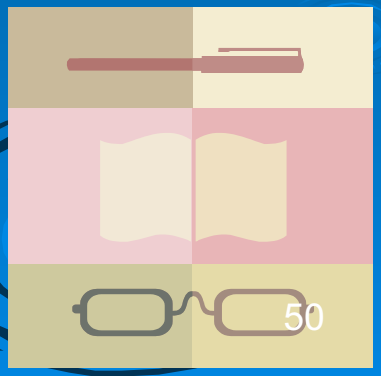
- Open-ended
- Complex
- authentic



Reliability: Snapshot vs. photo album

We need patterns that overcome inherent measurement error

- Sound assessment (particularly of State Standards) requires multiple evidence over time – a photo album vs. a single snapshot
- Should a teenager get their drivers license with just a written or just a performance assessment?



Peer Review

- NOT praise
- NOT blame
- IT IS professional discussion around specific criteria / design standards
- Be a good “listener” (by reading) What is the author trying to do and how can I help?
- Use design standards