Supporting Diverse Students and Teachers in Effective Classroom Assessment Through UDL

UDL-IRN Summit  #UDLIRN
June 2, 2020
2:30 - 3:30 pm ET
Slides: bit.ly/UDL-Formative-Assessment
Acknowledgement

We acknowledge that we are sited on the lands of the Massachuset, Pawtucket, and Wampanoag tribal nations. We acknowledge these legacies to stop the continued erasure of indigenous people and histories, and to re-center our understanding of the lands that we use as having been part of indigenous life and culture. To recognize the land is an expression of gratitude and appreciation to those whose territory we reside on, and a way of honoring the people who have been living and working on the land from time immemorial.
Poll question 1

Formative assessment is a type of testing.

True or false?
Poll question 2

If a tree falls in a forest and no one is there to hear, it makes a noise.

*True or false?*
Objectives

• Understand what formative classroom assessment truly is
• Learn about a future-reaching research project to support effective formative classroom assessment during science instruction for diverse learners
• Learn how UDL can inform the design of assessment instruments and dashboards to promote effective classroom formative assessment
Today’s speakers

• Bob Dolan
  Senior Innovation Scientist, CAST

• Kim Ducharme
  Director of Educational User Experience Design, CAST
Additional CAST team members

Jose Blackorby
Allison Posey
Cara Wojcik

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and the KU ATLAS team leads

Meagan Karvonen
Russell Swinburne Romine
Gail Tiemann
Outline

1. What is formative classroom assessment?
2. I-SMART project
3. Testlet design
4. Teacher dashboard
5. Questions & answers
1. What is formative classroom assessment?

2. I-SMART project
3. Testlet design
4. Teacher dashboard
5. Questions & answers
What do we want to know about students?

• Standards-aligned knowledge, skills, and abilities?
• Learning attitudes, beliefs, preferences?
• Current affective state?
• ...

Innovations in Science Map, Assessment & Report Technologies
Why do we want to know this?

- Teacher/system accountability
- Graduation/promotion decisions
- Identify supports, scaffolds, accommodations
- To plan subsequent instruction or remediation
- ...

Innovations in Science Map, Assessment & Report Technologies
What is formative assessment?

An assessment functions formatively to the extent that evidence about student achievement elicited by the assessment is interpreted and used to make decisions about the next steps in instruction that are likely to be better, or better founded, than the decisions that would have been taken in the absence of that evidence.

— Dylan Wiliam (2009)
What is formative assessment?

Formative assessment is a planned, ongoing process used by all students and teachers during learning and teaching to elicit and use evidence of student learning to improve student understanding of intended disciplinary learning outcomes and support students to become more self-directed learners.

FAST SCASS (2018)
What else might formative assessment help with?

UDL tells us to provide options

Can formative assessment help determine which ones, for whom, and under what conditions?
What it’s not

The core problem lies in the false, but nonetheless widespread, assumption that formative assessment is a particular kind of measurement instrument, rather than a process that is fundamental and indigenous to the practice of teaching and learning.

Margaret Heritage (2010)
Back to falling trees in empty forests

So if a “formative assessment” is administered but its results aren’t used to inform subsequent instruction, is it formative?
But implementing formative assessment is hard

- Supporting teachers in learning and applying formative assessment as an instructional technique is critical (e.g., Shepard, Wylie, Popham, Stiggins)
- Consider need for
  - Professional development
  - Classroom-level support
Poll question 3

There’s a role for formalized tools in formative assessment.

*True or false?*
But implementing formative assessment is hard

- Supporting teachers in learning and applying formative assessment as an instructional technique is critical (e.g., Shepard, Wylie, Popham, Stiggins)
- Consider need for
  - Professional development
  - Classroom-level support
- Consider potential for
  - Item banks
  - Classroom tools/techniques/technologies
  - Teacher-centric “data dashboards”
1. What is formative classroom assessment?

2. I-SMART project

3. Testlet design
4. Teacher dashboard
5. Questions & answers

Innovations in Science Map, Assessment, and Report Technologies

https://ismart.works
I-SMART

• Multi-state project funded through U.S. Dept. of Ed’s Competitive Grants for State Assessments program
• Focused on developing innovative approaches to science assessments using principles of evidence-centered design and UDL
• Builds upon existing dynamic learning map (DLM) efforts in ELA, math, & science
I-SMART project goal

Improve achievement of multidimensional science standards for students with significant cognitive disabilities—and students generally struggling in science—through accessible, learning map model-based assessments and reporting tools
Dynamic learning map

Cognitive model that intentionally represent multiple pathways of learning
I-SMART team

[Map of the United States highlighting states like Missouri, New York, New Jersey, Maryland, Oklahoma]

[Logos of KU, The University of Kansas, Accessible Teaching, Learning, & Assessment Systems, and CAST]

[BYC Consulting]

[Innovations in Science Map, Assessment & Report Technologies]
I-SMART distinguishing features

- **Deep integration of UDL** into instructionally embedded tests, co-designed with students
- Supports students with significant cognitive disabilities **and students with and without disabilities** who are struggling to meet grade-level expectations in **science**
- Designed for **summative and formative** use
- Actionable **dashboard** to support teacher use of test results to inform instructional decision making, co-designed with teachers through a UDL lens
1. What is formative classroom assessment?
2. I-SMART project

3. Testlet design

4. Teacher dashboard
5. Questions & answers
The problem

Drop-in-out-of-the-sky assessments provide limited opportunity for students* to demonstrate their learning and limited opportunity for effective instructional decision-making.

*The audience/population for this part of the project: Students without significant cognitive disabilities, but struggling to meet grade-level standards.
Challenge

Applying UDL principles to design rich, engaging, instructionally embedded science assessments that support classroom formative assessment and provide state accountability data.
Poll question 4

A single assessment instrument can serve both summative and formative purposes.

*True or false?*
What’s are testlets?

- Instructionally embedded evaluations of student knowledge, skills, and abilities at different depths
- Presented as science phenomena to provide the contextual structure within the science narrative
- Science testlets cover both NGSS Disciplinary Core Idea (DCI) and Science and Engineering Practice (SEP)
Science learning map model neighborhood
Testlet design approach

• Leverage UDL to provide students multiple means to demonstrate their knowledge, skills, and abilities
• Iterative co-design with students
Co-designing with students

Nodes for the middle school example:

1. Use a model to describe a feeding relationship between two living things. (SCI-324)
2. Recognize that people eat animals, which eat plants. (SCI-481)
3. Recognize that consumers eat plants or other animals. (SCI-656)
4. Recognize predation. (SCI-518)
Imagine you are the science expert helping the governor decide what to do about a problem in the ecosystem.

Choose an ecosystem to start. (Hint: watch the videos to help you decide)

Rainforest > The jaguar population is declining.
Vacant lot near school > The coyote population is declining.
Ocean > The shark population is declining.

Here’s the governor’s problem:
The population of shark is declining. Should we make laws to protect the sharks? Why or why not?

First, use the clipboard to think about the pros and cons.
Testlet prototype designs

Food webs show feeding relationships between two living things.

Put an arrow between two living things to show the feeding relationship.

When you put lots of feeding relationships together, it makes a food web. At the base of a food web are the producers.

Put more producers into the food web.
Testlet prototype designs

Second level consumers (predators) eat first level consumers (prey).
Drag and drop the second level consumers into the food web.

Great — you have built the whole food web!

Before you move on, is there anything you’d like to add to your pros and cons list?
(Pros: fast and engaging)

Hint  Glossary

Check my answer
Testlet prototype designs

To advise the governor, think about what would happen by creating a storyboard. If there were no laws protecting sharks...

1. First, the shark population is declining.

... what happens to the shark's prey?
(Drag & drop from the options below.)

- More of the shark's prey (tuna) survive.
- Fewer of the shark's prey (tuna) survive.
- There is no change in the shark's prey.

Pass! Use the food web for clues.

Check my answer

To advise the governor, think about what would happen if there were no laws protecting sharks.

1. First, the shark population is declining.
2. More of the shark's prey (tuna) survive.

What happens to the tuna's prey?

- There are fewer shrimp.
- There are more shrimp.
- There is no change in the number of shrimp.

Pass! Use the food web for clues.
To advise the governor, think about what would happen if there were no laws protecting sharks.

1. First, the shark population is declining.
2. More of the shark’s prey (tuna) survive.
3. There are fewer shrimp.
4. There is more plankton.

As you can see, many feeding relationships are impacted if we don’t protect the shark. The ecosystem is less balanced.

Wow, you learned a lot about food webs and feeding relationships.

You built pros/cons list

you created a food web,

and created a storyboard!
Testlet prototype designs

As an ecologist, what advice will you give the governor?

Your claim:

We should / should not make a law to protect the predator.

Evidence:

Use evidence from these tools to support your claim to the governor:

- pros and cons list
- food web
- cause & effect storyboard

Add evidence from your list:

Say what would happen if we don’t protect the sharks by using any other evidence you think is important from your pros/cons list.

Save
Testlet prototype designs

Add a note from your food web:
Any who wish it happen. I wish that I protect the sharks by using evidence from the food web.

Here is your final advice for the governor.

Dear Governor,
As an ecologist, I think you should make a law to protect sharks.

Here is why:
- Some benefits I think are important are...
- The food web shows that everything is connected. We will upset the balance if we don't protect sharks.
- The storyboard shows how the ecosystem will get imbalanced if the shark population continues to decline.

I'm ready to send my advice to the governor.
Testlet prototype designs

Well done! You have received a thank you letter from the governor.

Dear student,

Thank you for your advice on what to do about the sharks! We truly value your suggestions as an ecologist.

Now we clearly understand the problem and what to do about it. We are confident that our ocean will again return to a balanced ecosystem — for the benefit of all the ocean life, and for us humans, too!

Sincerely,

The Governor

The governor
Welcome to EcoSim!
You are about to go on a journey as a scientist. You will be helping the governor of your state solve a problem with the ecosystem.

But first, we want to let you know that there are many tools you can use on this journey. Try them out!

**EcoSim**

**Term & Definition**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ecologist</td>
<td>someone who studies the relationships of organisms and their environment</td>
</tr>
<tr>
<td>ecosystem</td>
<td>the complex community of living and non-living things</td>
</tr>
<tr>
<td>producer</td>
<td>an organism, often a plant, who makes its own food using energy from the sun</td>
</tr>
<tr>
<td>first level consumer</td>
<td>also called an herbivore,</td>
</tr>
</tbody>
</table>

**Examples**

- Ecologist: I saw an ecologist at the town park studying the different plants and animals that live there.
- Ecosystem: A living thing that gets its nutrients from the sun, soil, and air.
- Producer: When I look out my window, I see grass and trees—those are the producers.
- First level consumer: Some first level consumers I see around school are
Imagine you are the science expert helping the governor decide what to do about a problem in the ecosystem.

**Choose an ecosystem to start.** Just want the action to help you decide!

Rainforest: The paper population is declining.
Vacant lot: The paper population is declining.
Ocean: The shark population is declining.

**First, use the clipboard to think about the pros and cons.**

1. Improve the local environment for fish.
2. More of the shark's prey (tuna's supply).
3. More of the shark's prey (tuna's supply).

**What happens to the tuna's prey?**

- There is no change in the number of fishing.
- More of the shark's prey (tuna's supply).
- More of the shark's prey (tuna's supply).

**Your claim: We should / should not make laws to protect the predator.**

**Evidence:**

Use evidence from these tools to support your claim to the governor:
1. pros and cons list
2. food web
3. cause & effect storyboard

**Here is your final advice for the governor.**

Learn more about the ecosystem's impact on the tuna and the larger ecosystem.

Dr. John Long: I'm ready to send my advice to the governor.

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**NEWS**

Rumors are flying - 100 million sharks every year!

The population of sharks is declining. Should we make laws to protect the sharks? Why or why not?

Drag and drop the second level consumers into the food web.

**Food webs show feeding relationships between two living things.**

Put an arrow between two living things to show the feeding relationship.

Dear Governor,

As an ecologist, I think you should take some steps to protect sharks.

Here's why:

- Some benefits think we important are...
- The food web shows that everything is connected. It's not just the number of sharks.
- The number shows how the ecosystem will continue to function. Without sharks, the population continues to decline...

I'm ready to send my advice to the governor.
Next step

• Develop testlet prototypes
• Conduct cognitive labs/think-alouds with students spring 2021
1. What is formative classroom assessment?
2. I-SMART project
3. Testlet design

4. Teacher dashboard

5. Questions & answers
The problem

Teachers are swimming (drowning) in data generated by assessment instruments, generally presented in a unusable, unactionable ways
Challenge

Applying UDL principles to design a dashboard that supports teachers’ use of learning map models during formative assessment
What are dashboards?

The good ...
What are dashboards?

The bad and the ugly ...
The starting point
Poll question 5

Instructional planning using assessment results and learning maps is too complex to be effective.

True or false?
Dashboard design approach

• Leverage UDL to provide teachers a flexible interface and scaffolds that supports their use of learning map models in interpreting student testlet results for instructional decision-making

• Iterative co-design with teachers
Scaffolding map views
Multiple means of data representation
Next step

- Complete dashboard prototype development
- Conduct teacher usability/utility study (this summer)

Try out the design prototype: bit.ly/DLM-dashboard-prototype
Conclusion

Does UDL have a role to play in designing more equitable, next generation educational solutions?

We think so!
1. What is formative classroom assessment?
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The contents of this presentation were developed under a grant from the Department of Education. However, those contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the Federal Government.