Authentic Assessment in STEM courses

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California Community Colleges | California Virtual Campus

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Outcomes

1. Identify confounding variables for fixed assessments.
2. Discuss examples of adaptable assessments.
3. Design assessments that are adaptable, accurate and authentic using the Designing Adaptable Assessments Worksheet

Warm-up

What is the purpose of assessment?

Assessments

Assessments can be used for:

- Measurement
- Learning
- Collaboration

Creating assessments that are:

- Adaptable
- Accurate

Our goals for this section

- Compare and contrast fixed and authentic assessments
  - Lower-level Outcomes
  - Higher-level Outcomes

Learning Outcome 1

Define and group terms

- Peptide Bond
- Lactose
- Cholesterol
- Wax
- Polysaccharide
- Nucleotide
- Cellulose
- Nitrogenous base
- Monosaccharide
- Triglyceride
- Glucose
- Amino acid
- Disaccharide
- Fatty Acid
- Deoxyribose
- Chitin
- Phospholipid
- Ribose
- Lipid
- Protein

Tests: Traditional Assessment

What are some confounding variables for this assessment?

Which relationship is different?

A. Phospholipid / Lipid
B. Amino Acid / Protein
C. Monosaccharide / Polysaccharide
D. Monosaccharide / Disaccharide

The alternative

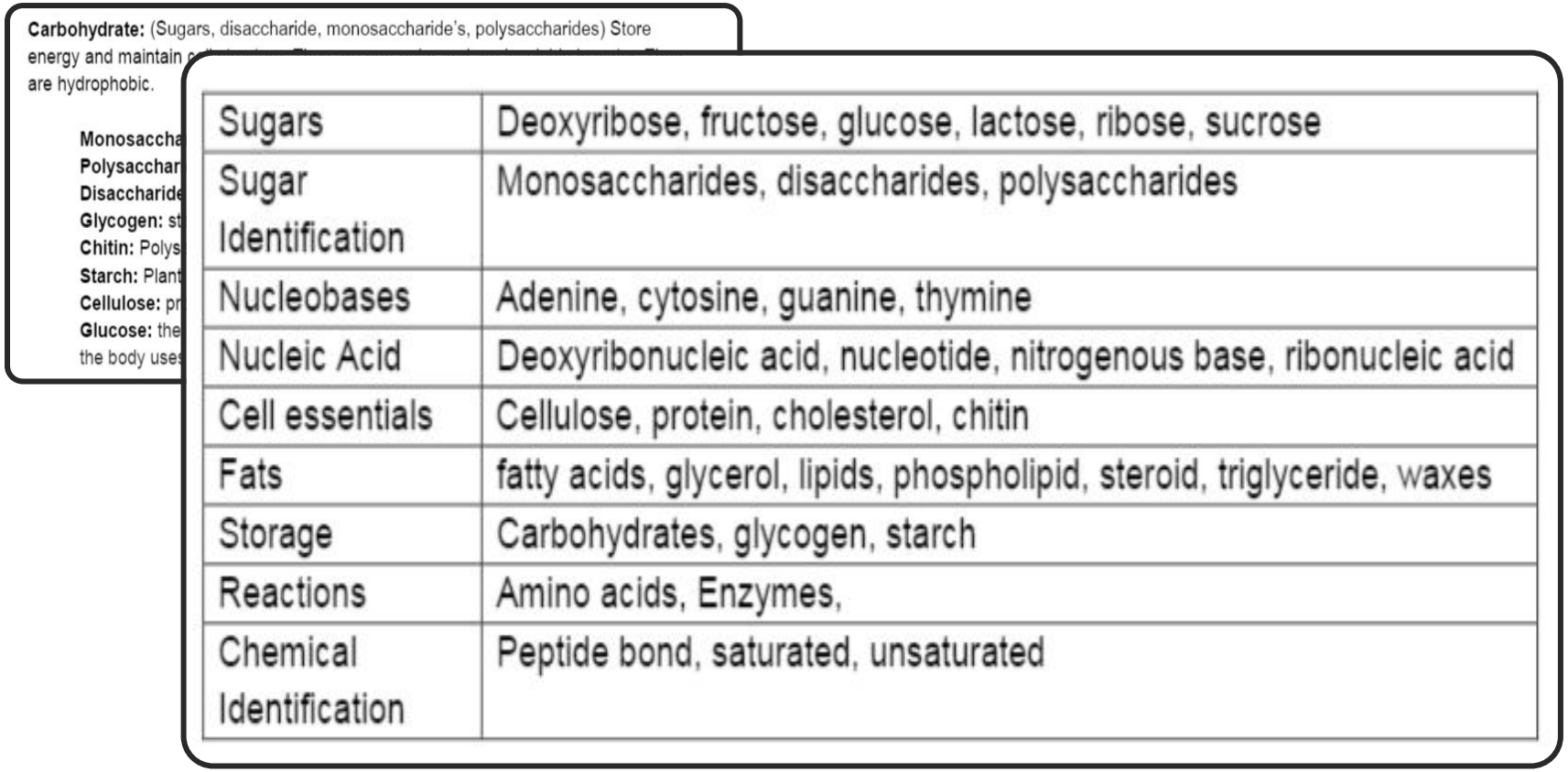
- Clearly identify the learning outcome
- Provide a clear and detailed rubric
- Let students select the strategy for demonstrating knowledge

Student Approach: Outlines

Carbohydrate: (Sugars, disaccharide, monosaccharide's, polysaccharides) Store energy and maintain cell structure. They are non-polar and are insoluble in water. They are hydrophobic.

Monosaccharide: Simple sugar
Polysaccharide: When numerous monosaccharide's are joined together.
Disaccharide: double sugar, two monosaccharide's connected.
Glycogen: starch in plants
Chitin: Polysaccharide N- acetyglucosamine
Starch: Plant product formed together by bonding together thousand of glucose.
Cellulose: produced by plants, it's a polysaccharide of glucose.
Glucose: the most abundant monosaccharide in nature. It is the sugar molecule the body uses to create energy, and it is the fuel used by brain cells.

Student Approach: Tables

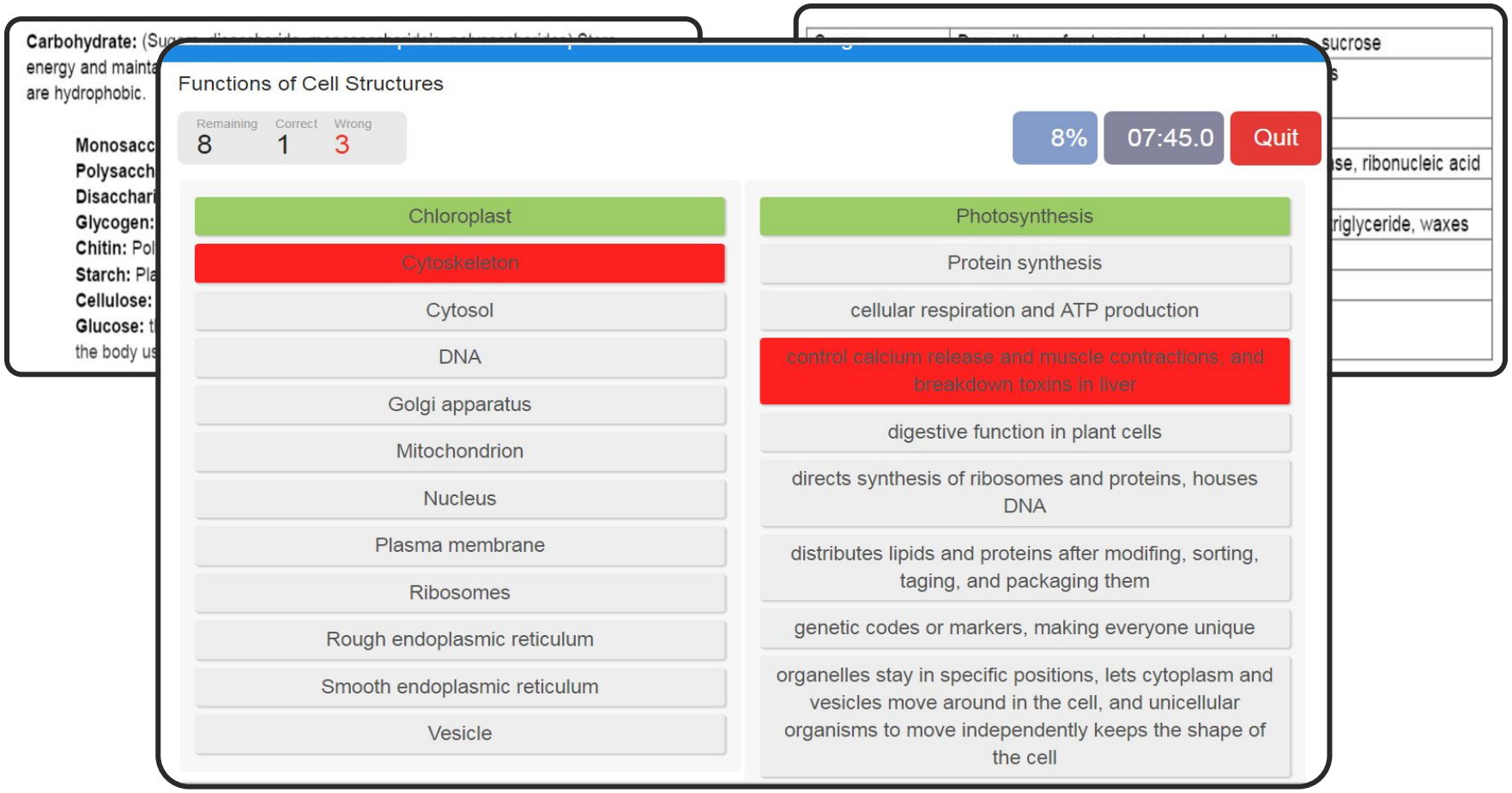


Carbohydrate: (Sugars, disaccharide, monosaccharide's, polysaccharides) Store energy and maintain
are hydrophobic.

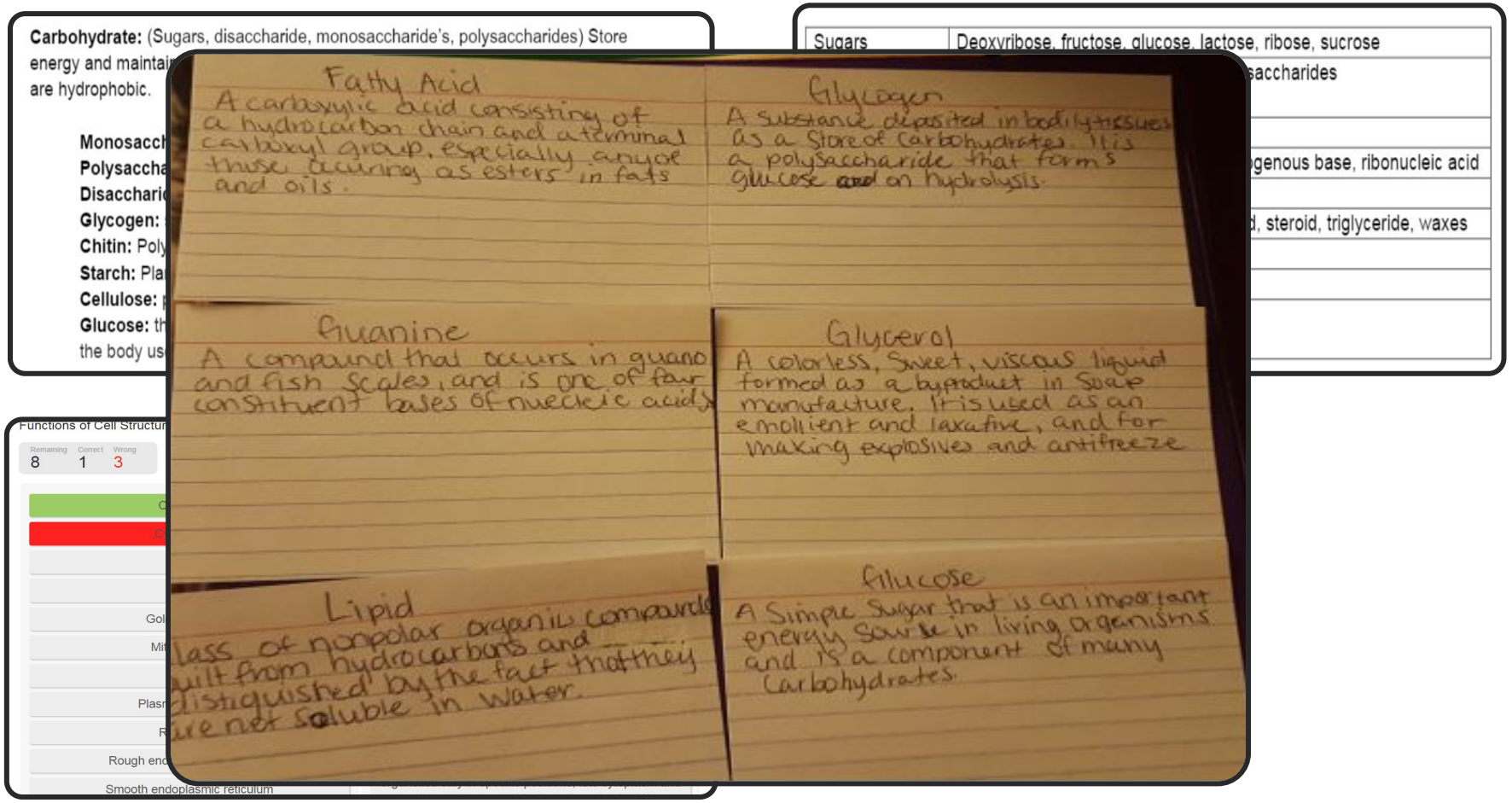
Monosaccha
Polysacchar
Disacharide
Glycogen: st
Chitin: Polys
Starch: Plant
Cellulose: pr
Glucose: the
the body uses

Sugars	Deoxyribose, fructose, glucose, lactose, ribose, sucrose
Sugar Identification	Monosaccharides, disaccharides, polysaccharides
Nucleobases	Adenine, cytosine, guanine, thymine
Nucleic Acid	Deoxyribonucleic acid, nucleotide, nitrogenous base, ribonucleic acid
Cell essentials	Cellulose, protein, cholesterol, chitin
Fats	fatty acids, glycerol, lipids, phospholipid, steroid, triglyceride, waxes
Storage	Carbohydrates, glycogen, starch
Reactions	Amino acids, Enzymes,
Chemical Identification	Peptide bond, saturated, unsaturated

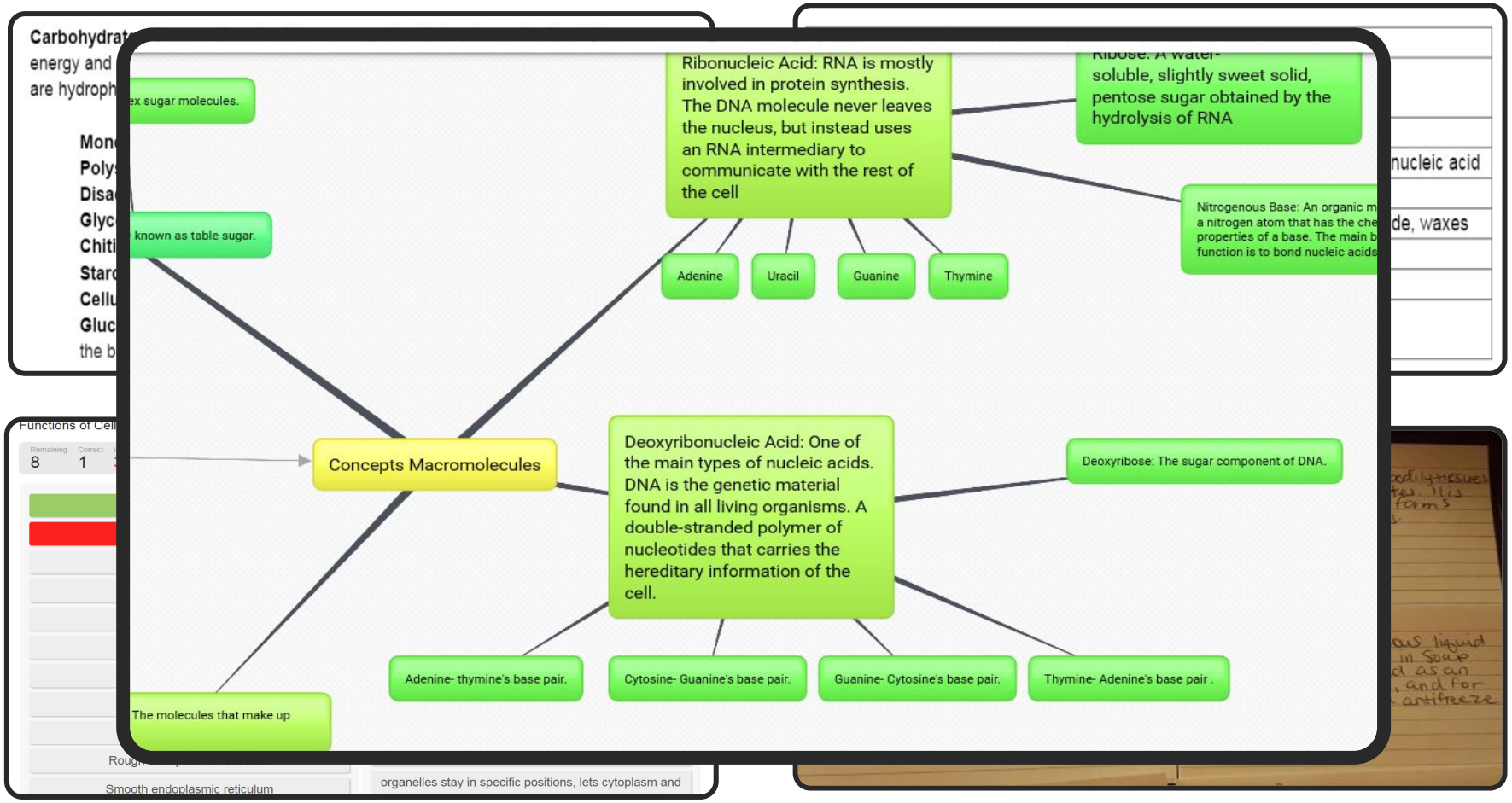
Student Approach: Online Flashcards



Student Approach: Handwritten Flashcards



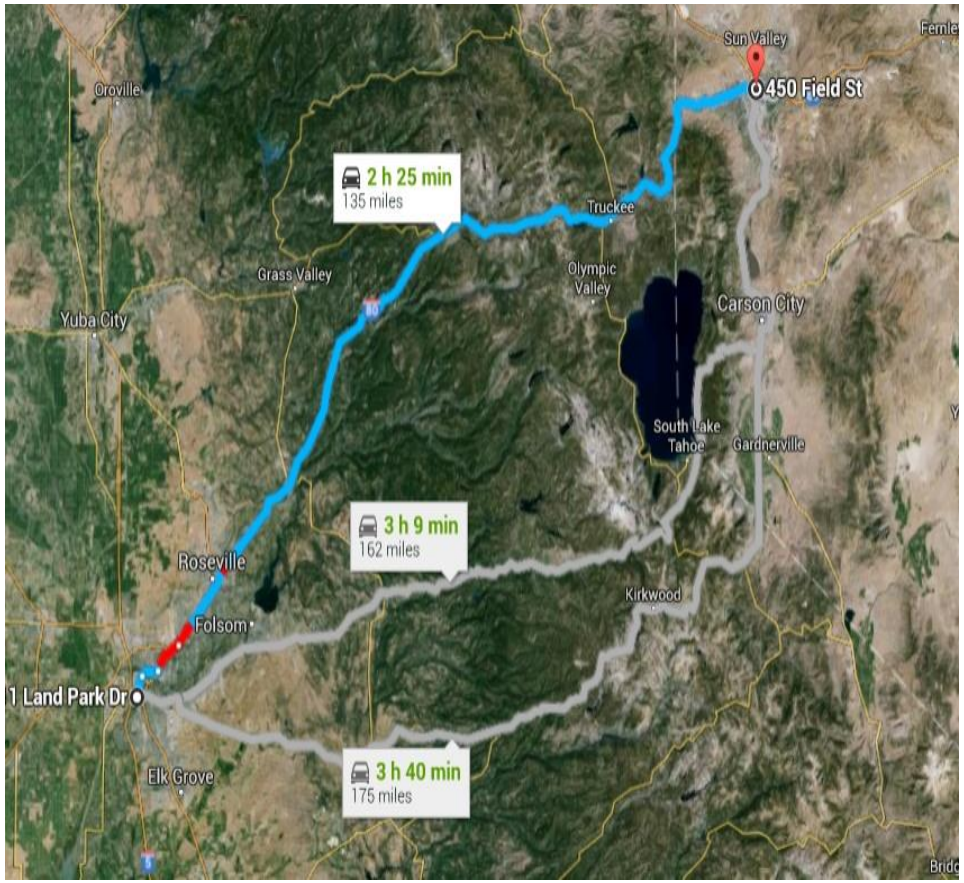
Student Approach: Mind Maps



Benefits

- Assessing SLO directly - single variable
- Students learning is focused on content rather than form
- Helps Identify misconceptions
- Universal Design for Learning
  - Multiple means of action and expression
  - Multiple means of engagement
  - Multiple means of representation

Choices and constants



- Constant
  - Content
  - Rigor
- Choices
  - Learning Resources
  - Assignments

Considerations

- Scaffold learning
  - Provide examples in early assignments
  - Encourage students to try different strategies in later assignments
- Provide a detailed rubric
  - Students know exactly what to do
  - Makes grading easier

TILT: Transparency in Learning and Teaching

- Discuss assignments' learning goals and design rationale before students begin each assignment
- Engage students in applying the grading criteria that you'll use on their work
- Debrief graded assignments

Pause for Processing

Questions, thoughts, ideas?

Learning Outcome 2

Explain a process

Explain how your nervous system allows to you see a pen on the table and pick it up. Include: sensory neuron, interneuron, brain, motor neuron, skeletal muscle, electrical message, chemical message, synapse, axon, dendrite, sodium channels, potassium channels, the Na/K pump, and ATP.

Essays: Traditional Assessment

What are some confounding variables for this assessment?

Write an essay explaining how your nervous system allows to you see a pen on the table and pick it up.

Reflect and discuss

How else can we assess the ability to explain a complex process?

Assessment options

- Multimedia presentations
- Case studies
- Portfolios
- Collaborative learning
  - Annotations
  - Study resources
- Open Educational Practices (OEP)
  - Renewable v. disposable assignments

Benefits and considerations

- Accurately assess synthesis
  - Teachable Moments
- Writing and test taking are important skills
  - Opportunities to explain the content in different ways
- Peer review
  - Provide training
- Self evaluations
  - Metacognitive skills

Learning Journals

- Identify where they found information (w/ citation)
- Explain their learning process
- How did they progress through the assignment
  - Where they ran into challenges
  - How they overcome challenges

Benefits (1)

- Helps students
  - Metacognitive skills
  - How to approach learning difficult topics
- Helps me
  - understand how to help each student
  - with ongoing course improvements

Benefits (2)

- Helps prevent cheating
  - Students more likely to cheat with fewer, high stakes assessments
  - Easier for me to see similarities
- Helps overcome AI concerns
  - Ask for specific information from references
  - Link to the book or lectures

Working with AI

- New - Fact checking option for assignments
- Copy answer from AI
- Find reliable resources (or information from lectures) that verifies each point
- Remove topics not covered in class
- Add examples from class

Pause for Processing

Questions, thoughts, ideas?

What is an authentic assessment?

Authentic assessment	Low-impact assessment
Requires students to do something to demonstrate knowledge and skills.	Requires students to respond to a question to demonstrate knowledge and skills.
Fosters active learning.	Fosters passive learning.
Requires students to contextualize and apply what they have learned.	Asks students about what they have learned out of context and tends to encourage rote memorization.
Achieves deep learning, which is more likely to transform students' views and be remembered.	Achieves shallow learning that is less likely to be retained over long periods of time.
Inspires students to make connections between course content and the real-world.	Generally keeps learning confined to a book or other academic context.

Discuss and Practice

Assessment Worksheet

Resources

- TILT – Transparency in Learning and Teaching
- UDL – Universal Design for Learning
- Understanding by Design
- Culturally Responsive Assessment
- Biology Class with sample assignments and rubrics

Thank you!

Recorded webinars and a schedule of upcoming events are available at onlinenetworkofeducators.org/spring-2024-webinars.

Email support@cvc with any questions!