Learning Outcomes Assessment Menu

Individual Assessment for BIOL& 160 - Fall 2017

Assessment name

Burning sugar

Created by

Colleen Sheridan
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Outcome to assess

Describe the pathways and molecular events that occur when a cell is producing energy from sugar under aerobic or anaerobic conditions.

Briefly describe the teaching methods (e.g. lessons, activities, etc.) that you used to help students learn the course outcome.

I will describe how I introduced our second unit, "How Matter and Energy Flows Through Cells." I started by asking my students for help with a problem: "A friend of mine just lost some weight...and now she can't find it. It's not in her car. It's not in her refrigerator. Her kids didn't take it....Where does the weight go when someone loses it?" I then asked my students to grab a small personal whiteboard and pen and eraser and team up with a neighbor to write down their hypotheses of where they think the weight goes when someone loses it. We practice well-established rules of deliberation, where students are asked to listen to all ideas and make sure everyone is heard, and then, although everyone may not agree with the hypothesis, everyone must agree to try one hypothesis first. Later, they can then gain new information, reflect on their previous hypothesis, and revise it to come up with a new hypothesis to try if needed. After this, I collected all the whiteboards, shuffled them (and unexpectedly erased some information while doing so – I won't do that again!), and showed everyone all of the hypotheses from the class on the document camera. Every time I teach this lesson, most students will hypothesize that the weight "turns into heat and burns off." I then counter this hypothesis with a couple of questions for a brief whole class discussion, "What about the principle of the conservation of matter, where matter cannot be created or destroyed, it just rearranges? And what about the principle of the conservation of energy – where energy cannot be created of destroyed, it just changes form? According to these principles, can weight (which is matter) just disappear and turn into energy?" After this discussion, we then move to obtaining evidence to figure out what happened to the weight. In this phase, I ask them to tell me what would happen to the weight of a marshmallow if I were to burn it. Would the weight increase, decrease, or stay the same? Usually most everyone agrees that it would decrease. I ask them to keep in their minds, "Why? What is happening that is causing the marshmallow to lose weight?" We then go about finding evidence for what happens to the weight of the marshmallow and while doing so derive the equation for cellular respiration. Once they derive this equation, I then ask them to use this new information to reflect and revise their old hypothesis about what happens to the weight when someone loses it.

"Very cool group activity. Though it seems the white boards were problematic :)" — WMoses December 3, 2018

Briefly describe the assessment method (e.g. quiz, test, paper, survey, practicum, etc.) you used to measure whether the student met the outcome, including your established level of student proficiency.

Although I used formative assessments during class to gauge their learning, this was through group work. So my assessment of whether individual students met the learning outcome was on a written exam where I posed the question:

"Explain where the weight goes when someone loses weight. In your answer please include the following (8 pts):

- lipids
- fatty acids
- glycerol
- oxygen
- cellular respiration
- carbon dioxide
- water
- what way does the weight leave the body?"

They had to explain that weight from fats (lipids) were broken down into fatty acids and glycerol, and that these products, along with oxygen, then entered the cellular respiration pathway, where they were broken down further all the way to carbon dioxide and water. The weight, now in the form of carbon dioxide and water, would then leave the body by breathing out the carbon dioxide and urinating, sweating, defecating, and/or breathing out the water.

The question was worth 8 points, 1 point for each term used correctly in context while explaining the question. My cutoff for proficiency was 80%, meaning they had to score >= 6.5/8 points.

"Clear." — WMoses December 3, 2018

How many students met the outcome? How many did not?

Sections to assess - no section history	Outcome Met	Not Met	Percent Met
6024 TTh 1:30p Face-to-Face	13	7	65

Reflect on the effectiveness of your teaching and/or assessment methods. What worked and what did not?

When I initially taught this curriculum many years ago, I was teaching in a lab classroom where students were seated at lab benches where they could easily turn and talk to students behind them in groups of four and I could easily walk around and talk to them all, helping them to think more deeply about our activity. Now, I have 21 students spread out in a stadium-seating classroom with chairs that don't turn around and very narrow aisles where I often trip over students' feet and bags in my effort to talk to them, thus, slowing my progress around the room. In order to decrease the amount of time needed to talk to 10 groups of 2-3 students, after their first conversation with a partner, I then asked my students to share their hypothesis with another group and come up collectively with a single hypothesis within that group. After this, I then had only 5 groups to visit. (Now that I think about it, because of the stadium seating and difficulty getting to my students, I do not do as much small group questioning as I used to do.)

During the evidence gathering phase, once again, I originally designed this curriculum to take place in a lab classroom, where I could set marshmallows on fire at will and we could weigh the marshmallow before and after burning and do some experiments to show that as the marshmallow lost weight, oxygen gas was being consumed while carbon dioxide gas and water vapor were being produced. They would then have evidence to explain what happened to the weight of the marshmallow and be able to derive the equation for cellular respiration, allowing them to reflect on and revise their old hypothesis of what happens to the weight when someone loses it. However, since I am in a lecture classroom, I made videos of this experiment and stored them on my Google Drive, thinking I could just show them when the time came. Not as exciting, but still valuable evidence that they would need to revise their hypotheses. However, my videos did not play, due to some likely problem of streaming videos over our classroom WiFi to my iPad. ARGH. So instead of showing them evidence, I had to tell them instead - definitely not as satisfying.

"Nice reflection." — *WMoses December 3, 2018*

Did you change or do you plan to change your teaching methods and/or assessment methods in response to the data you've collected? If yes, please describe these changes.

(•) Yes ( ) No

So what will I do next time to help solve my problems of stadium seating, increasing my small group questioning to help students with sense-making talk, and providing them with evidence? I will move my class closer together so that I don't waste a lot of time trying to get to all of them. Also, if my class is small enough, I could schedule room 13-107 which is a small room with movable tables and chairs, much more amenable to small group work. I will also refocus my efforts to make sure that I am questioning them as much as I would like, to help them come up with the ideas instead of having me tell them. I will also load my videos on the classroom computer to avoid having to stream over WiFi and or embed them into a Powerpoint presentation.

"One of the challenges of teaching in our traditional lecture rooms." — *WMoses December 3, 2018*

Viewable by

Campus community

Submitted for review

December 14, 2017

Reviewed

December 3, 2018 by WMoses

"This assessment will be featured as an example of best practices at Highline" — *WMoses December 3, 2018*